Perceptual- Motor Development for Children who Display Signs of Attention Deficit Hyperactivity Disorder (ADHD)

by

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DECLARATION

By submitting this dissertation electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the owner of the copyright thereof (unless to the extent explicitly otherwise stated) and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

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Abstract

The influence of a six-week perceptual-motor and attentional skills programme, combined with teaching strategies, on the motor proficiency and attentional abilities of children diagnosed with ADHD was investigated. The five case study individuals (ranging for Grade 1- 7) took part in a six-week *Purposeful Play Programme.* Baseline, pre-test and post-test scores were obtained from the *Bruininks- Oseretsky Test of Motor Proficiency* (BOTMP) and *Attention-Deficit Hyperactivity Disorder Test* (ADHDT). All five case study individuals showed a significant improvement on their motor proficiency during retention tests as well as improvements on some of the behavioural soft signs of hyperactivity, impulsivity and inattention.

Opsomming

Die invloed van ŉ sesweek perseptueel-motoriese en aandagvaardigheidsprogram, gekombineer met onderrigstrategieë, is op die motoriese vaardighede en aandagvermoëns van kinders gediagnoseer met ATHS, bestudeer. Die vyf gevallestudie individue (tussen Graad 1- 7) het aan ‘n sesweek *Purposeful Play Programme* deelgeneem. Die basislyn-, voor- en natoetstellings is verkry vanaf die *Bruininks- Oseretsky Test of Motor Proficiency* (BOTMP) en *Attention-Deficit Hyperactivity Disorder Test* (ADHDT). Al vyf gevallestudie individue het ŉ beduidende verbetering in motoriese vaardigheid getoon tydens retensietoetse asook verbetering in sommige van die gedragstekens van hiperaktiwiteit, impulsiwiteit en afleibaarheid.

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Chapter One
Setting the Problem

Physical Activity is a process that involves accumulating a wide variety of movement experiences (Pangrazi, 2007). Physical activity positively impacts the growth and development of children. Research supports the value of an active lifestyle for optimum growth and development. There is a positive correlation between the incidence of certain health disorders and a sedentary lifestyle. Lifetime involvement in physical activity often depends on early participation and gratification gained from such participation. Developing motor skills at an early age provides the tools needed to be physically active throughout life (Pangrazi, 2007).

Physical activity in the forms of sports, exercise, physical education and play makes an important contribution to child development. One reason to value physical activity is the health benefit associated with a physical active lifestyle. Other reasons include the opportunity to meet developmental needs (Thomas, Lee & Thomas, 2008), for example:

- To explore and master your environment.
- To express yourself through movement.
- To feel satisfaction resulting from successful movement.

Physical activity also provides opportunity for affiliation, being part as a group. Physical activity and sport allow people to test their skill, fitness, and determination. People derive pleasure from the effort and accomplishments found in physical activity. Physical activity is often fun, thus another reason to value it (Thomas, Lee & Thomas, 2008).

Learning Through Physical Activity

One form of structured physical activity can be presented in a physical education programme. Within such a program physical activities is presented together with educational guidelines and outcomes to reach specific educational

and developmental outcomes. The learning-through-movement philosophy of physical education is based on the belief that effective physical education can positively influence both the cognitive and affective (social-emotional) development of children. Becoming physically educated by learning to move and learning through movement is an important aim of physical education. Gallahue and Donnelly (2003) defined the physically educated person in the following way:

- The physically educated person has learned skills necessary to perform a variety of physically activities.
- The person is physically fit.
- The person participates regularly in physical activity.
- The person knows the implications and the benefits of involvement in physical activities.
- The person values physical activity and its contributions to a healthful lifestyle

The following benefits of participation in physical education programmes have been described by teachers, practitioners and professionals. Research has also been completed to support many of these claims (Thomas, Lee & Thomas, 2008; Darst & Pangrazi, 2006; Gallahue & Donnelly, 2003):

Health Benefits

- Physical activity aids in improving and assisting holistic development of the individual.
- Physical activity aids in the improvement of strength, endurance, flexibility, coordination and cardiovascular capacity.
- A “healthy body” is often associated with a “healthy mind.”
- Physical education programmes can be effective in the prevention of being overweight, obesity and Type II Diabetes.

Social Skills Development Benefits

- Physical education helps learners learn to work together and aids in the development of communication skills and cooperation.
- Learners learn to have patience, understanding and show respect for others.

Emotional Development Benefits

- Learners are affected emotionally in terms of self-confidence, self-reliance, independence and through the release of endorphins, participation in physical activity can help create a happier individual.
- Fears can be overcome with necessary support and understanding from teachers and fellow classmates.
- Self-discipline, control and perseverance are taught.

Cognitive Development Benefits

- Learners are taught about the benefits of healthy living and a healthy lifestyle.
- Problem-solving skills are taught and encouraged.
- Learners are more aware of rules and importance of rules and regulations, not only in sport but as well as broader society.
- There can be an improvement in the development of academic skills, such as concentration and sequencing.

The physical benefits of participation in physical education define the unique developmental contribution of the subject in the curriculum. In a study done by Fredericks, Kokot and Krog (2006) the effects of a developmental movement education programme was explored in relation to the enhancement of the academic skills of Grade 1 learners. According to them the effect of movement on academic performance and cognitive development is often underrated. Many

theorists argue for the importance of movement to be recognized because there appears to be an elaborate interplay of brain and body. Fredericks *et al.* (2006) explained that the brain has the ability to adapt continuously, and its structure can be changed by certain kinds of stimulation, including movement. The body is a sensory-motor response system that causes the brain to organize itself.

Four groups of learners were used in a research project by Fredericks *et al.* (2006). Learners were randomly selected for one of the following groups: experimental, control, free-play and educational toys group. During the programme, a 10-week movement programme was presented to the experimental group. The programme focussed on experiencing the developmental sequence of movements through infancy, midline crossing, balance, proprioception, laterality, interhemispheric integration, vestibular work, convergence, divergence, visual accommodation, integration reflexes, listening ability, muscle tone and tactile discrimination. The results of the post-testing indicated that the learners in the experimental group showed a significant improvement in spatial development as well as in reading and mathematical skills, compared to the learners in the control group, free-play and educational toys-group.

A study by Goodway, Crowe and Ward (2003) looked at the effects of motor skill instruction on fundamental motor skill development. They found that a 9-week instructional programme on locomotor and object control skill development for pre-schoolers who were at-risk of developmental delay had a positive impact on the fundamental motor skill development of children involved in the study.

Trudeau and Shephard (2008) found that a physical activity programme delivered by competent instructors can be added to the school curriculum by taking time from other subjects without risk of hindering student academic achievement. On the other hand, adding time to "academic" or "curricular" subjects by taking time from physical education programmes does not enhance children’s marks in these subjects and may be detrimental to their health.

Carlson *et al*. (2008) examined the association between time spent in physical education and academic achievement in a longitudinal study of students in nursery school through fifth grade. Their study found that among girls, higher

amounts of physical education may be associated with an academic benefit. Physical education did not appear to negatively affect academic achievement in elementary school students. Concerns about the adverse effects of the time taken away from academics on academic achievement may not be legitimate reasons to limit physical education programmes.

Zachopoulou, Trevla, Kanstadinidou and Archimedes (2006) completed a study implementing a 20-lesson physical education programme to promote creativity in preschool children. Quantitative and qualitative data were collected and estimated with a pre- and post-program creative thinking evaluation. The results showed that children improved their creative fluency and imagination and useful information was provided by children's behavior during their participation in the proposed physical education program.

Another form of physical activity that can be presented to children in a less structured but mediated way to get the desired outcomes is Play. In play situations, children explore and find out new things. Play also provides children with opportunity to practice newly acquired skills (e.g. drawing and language skills). Through play they are able to practice their competence. It also provides opportunities for generating new ways of using objects. Play has an important influence on enhancing cognitive development in children (Louw & Louw, 2007).

Taking into account that physical activity and physical education have had positive influences on various aspects of child development, emotional growth and education, one asks the question whether participation may contribute to helping children who show signs of attention deficit disorder and attention deficit hyperactivity disorder (ADHD) cope with and gain some control over some of their detrimental behaviours.

Defining ADHD

Attention Deficit Hyperactive Disorder (ADHD) describes children who display persistent age-inappropriate symptoms or inattention and hyperactivity-impulsivity (Mash & Wolfe, 2002). It is regarded as a syndrome characterized by serious and persistent difficulties in the following three areas:

1. Attention span.

2. Impulse control.

3. Hyperactivity (sometimes).

Pughe- Parry (2007) described ADHD as an umbrella term for many behavioural problems and can encompass anyone from the hyperactive to the inattentive ADHD person. He viewed ADHD not as a psychological problem, but as a neurological problem that has psychological consequences. He stated that ADHD originates in the brain and that a person is born with the condition and there is no known cure as yet. Environmental and other factors may be involved in the etiology and certainly aggravate the neurological factors, causing a wide range of psychological problems.

Mash and Wolfe (2002) and Flick (1998) described ADHD as a multi-faceted condition with a variety of symptoms that present in different ways in children and adults. Each individual's temperament determines how the condition manifests itself, and each person's environment influences how it presents at any given time. They also identified the core characteristics of ADHD as inattention, impulsivity and hyperactivity.

It is important to take Harvey and Reid's (2003) view into account when thinking about strategies for helping a person with ADHD. They stated that ADHD should be seen as a multidimensional disorder consisting of interacting neurological, genetic and psychosocial causal factors. Multimodal treatment approaches are recommended for persons with ADHD because there is not one definitive cause of the disorder and co-morbidity is so frequent (Harvey & Reid, 2003).

Intervention Programmes

Intervention programmes can be implemented through the use of different teaching strategies and/or different presentations of content, as well as the manipulation of environmental aspects and psychological aspects.

Teaching Strategies

Effective teaching strategies are needed when working with children with AD/HD. The teaching strategies that were most frequently used out of various possibilities were: Verbal cues, motivation, visual and auditory cues, demonstrations, mental pre-set, maintain concentrations, attentional switching, organization, frequent and immediate feedback, individualised activities (Bester, 2006; Munden & Arcelus, 1999; Flick, 1998;).

Perceptual- Motor Content Programmes

Perception is the meaning the brain gives to a certain sensation sent to the brain by the sensory nervous system, produced by the different senses. Perceptual development is therefore not just the development of the senses but the development of the effectiveness and efficiency of the brain to relay and give meaning to stimuli from the sensory system (Pieterse, 2007). Many researchers and writers tend to use the terms perceptual development and sensory development interchangeably. Taking the position that if you concentrate on the development of the sensory systems that you do in fact also focus on the improvement of the perceptual motor system, thus the meaning the brain gives to the stimuli from sensory motor stimuli.

In a study done by Iwanaga, Kawasaki and Tsuchida (2006) the results indicated that fundamental sensory-motor abilities scores were notably lower in the ADHD-Combined group than in the norm group. Equilibrium and postural control difficulties were the most common problems in these children. The fine motor abilities for hand, mouth and tongue movement, and motor praxis were lower in the ADHD-C group. This underscores the need for examining and treating the sensory motor disabilities of boys with ADHD-Combined in their pre-school years. Boys with ADHD-C have relative strengths in simple movements, simple auditory memory, and non-motor visual perception. Teachers and professionals should adopt methods to make the most of these strengths.

Platzer (1976) postulated that the general self-concept of children, who do poorly in gross-motor skills and rate low in self-concept, may be improved by

successful experience in perceptual-motor activities, which in turn may positively influence performance on other types of tasks.

Platzer (1976) also emphasized the importance of incorporating perceptual-motor training into the regular preschool curriculum. Support indicates that the greatest amount of perceptual-motor changes occur in children before the age of seven years. Therefore, it seems imperative to identify children with perceptual-motor deficits as soon as possible and to provide effective specialised programs to remediate present perceptual-motor deficiencies. American Occupational Therapy Association Division of Practice, Education and Research supports the notion that there is a need for early screening and evaluation of pre-school children to identify developmental lags (delay in development), deficits, and/or behaviours that may interfere with children's ability to learn and function in the school environment.

Environmental Aspects

Largo, Fischer and Rousson (2003) indicate that epidemiological studies have shown that about 6% of all school-aged children are described by experts and parents as uncoordinated in their fine and gross motor skills. Thus, in almost every nursery school class and every school class there are "clumsy" children. These children described as being "clumsy" have more difficulty than their peers when playing ball games, as well as with certain fine motor tasks like drawing or writing. For the children it makes them less 'capable' than their peers and can have manifold consequences. Their well-being and self-confidence may suffer from the failure and rejection. Subtle neurological signs serve not only as markers for mild motor impairment, but they have also been related to behavioural disturbances, such as hyperactivity, impulsiveness, learning disabilities, aggressive antisocial conduct and psychotic disorders and even anxiety and depression. A prerequisite for all professionals dealing with normal and developmentally disrupted children is the profound knowledge of normal development (Largo, Fischer & Rousson; 2003).

Solan, Shelley-Tremblay and Larson (2007) is of meaning that as early as the pre-school level, an intact vestibular system contributes to sensory integration and the maturation of eye-movements that are required for efficient reading and

learning. The vestibular apparatus has been identified as the sensory organ that detects sensations concerned with an individual's balance and equilibrium. Although either of these complementary dependent variables, vision and hearing, may function independently, together they dominate our primary learning processes. The predominance of visual-vestibular control of balance gives way to a somatosensory-vestibular dependence by the age of three, but the transition to adult like balance responses is not complete for all sensory conditions even by age 6. Since vestibular responses are associated with eye to visual and auditory processing.

Clinical experience supports the notion that delayed vestibular maturation may be associated with sensory integrative dysfunctions, slow visions processing, and delayed acquisition of reading skills in primary and middle grade elementary school children. The vestibular system is very complex. It involves interconnections with the inner-ear, superior temporal cortex, insula and the temporal-parietal junction within the cortex, and the postural and extraocular muscle system, all of which contribute to the overlap in the cortical systems. Uncorrected vestibular disorders can ultimately affect attention processing and result in cognitive dysfunctions. In addition to more commonly known deficits in balance and posture, problems with vestibular function can also be associated with deficits in object recognition, spatial navigation, learning and memory. One mechanism by which vestibular disorders adversely affect attention is the distracting influence of increased body sway and postural lean. Additionally, the psychological sequelae of vestibular disorders, which may include anxiety and depression, could negatively affect the cognitive resources available for information processing (Solan, Shelley-Tremblay & Larson, 2007).

Psychological Aspects

Children who experience success are more likely to continue an activity and challenge themselves. Children who are asked to do something they cannot do will experience stress and have one of two responses, “fight- or-flight”, when they are under stress. Children with learning disabilities, ADD, autism and emotional problems can benefit greatly from perceptual- motor programs (Cheutum & Hammond, 2000).

One of the problems facing the educational psychologist is therapy for the intelligent child who is failing to meet the academic and social demands of a regular school programme because of his/her distractibility, short attention span, inability to organize and stick with a task, poor retention of details and aggressive socially withdrawn behaviour (Engelbrecht, 1989).

Purpose of the Study

The purpose of this study was to investigate whether a perceptual- motor and attentional development program could have a positive influence on the motor proficiency and attentional capacity (hyperactivity, impulsivity and inattention) of children. The investigator was particularly interested in exploring the effects of a perceptual-motor program on the soft signs of hyperactivity, impulsivity and inattention of children who show signs of ADHD. Some of these soft signs may be children being unable to follow directions, finish tasks on time or at all, easily distracted, unable to sit still for long periods, twisting, wiggling etc.

Intervention Programme

An individualized movement programme entitled “Purposeful Play” was developed for the purpose of the study. The word play in Purposeful Play was used to set a specific tone for the programme. The notion behind this is that the programme focused on specific “purposeful” outcomes within a playful and not intimidating environment. Hence the feeling of playful and playing for enjoyment deriving pleasure from effort and feelings of accomplishment as earlier stated by Thomas, Lee and Thomas (2008). This programme consisted out of 3 important pillars (see Figure 1):

- A perceptual- motor programme where gross motor skills were used to develop the motor proficiency and gross motor abilities of the children in the study, by participating in a perceptual- motor programme. A Perceptual-motor programme focuses on the development of a child's important senses, namely: Body Awareness, Proprioceptive, Vestibular, Visual, Auditory and Tactile Systems.
- Secondly, an attentional skills development facet that was designed to aid the children, showing signs of ADHD, in developing their attentional skills, reported on the ADHDT (hyperactivity, impulsivity and inattention- over a 12 week period).
- Thirdly, a teaching and behavioural strategies leg to develop the capabilities in focus and training of these children who show signs of ADHD.

Figure 1

Elements on the complete "Purposeful Play" intervention programme model

Research Questions

1. Will a Perceptual- motor development programme improve the movement proficiency of children who show signs of ADHD?

2. Will a Perceptual- motor development programme have a positive impact on the behavioural characteristics of children who show signs of ADHD, based on improvements of their behavioural soft signs (hyperactivity, impulsivity and inattention) as reported by their teachers?

3. Will a Perceptual- motor development programme have a positive impact on the behavioural characteristics of children who show signs of ADHD, based on improvements of their behavioural soft signs (hyperactivity, impulsivity and inattention) as reported by their parents?

Significance of the Study

ADHD is a chronic disorder. Some believe that it can begin in infancy and extend throughout adulthood, having negative effects on a child's life at home, school, and within the community. It is conservatively estimated that 3 to 5 % of our school-aged population is affected by ADHD. Some believe that because a person is born with the condition it means that the ADHD person can never lose the condition (out grow), but the person can learn to manage the condition so that it does not impair the persons day to day living in any way. With the prevalence of ADHD affecting between 3 to 5% of all school-going children, we need to find particular ways to help these children in their day-to-day life. Early identification and intervention has been mentioned consistently as the best way to address the influence of these children's state on their day to day life; and possibly help them to develop management skills to help them better cope (Platzer, 1976).

Some believe that ADHD can be as a result of disorders that are social constructs. The notion that if someone tells or convinces you long enough that you have a certain condition that at some stage that person will start acting the part and really show the signs of ADHD. Perhaps the best way to judge whether ADHD is a social construction, therefore, is not to look at the worldwide prevalence of its symptoms, but rather to evaluate the prevalence of its recognition and treatment (Polanczyk, 2007).

Unfortunately, specialised assessment and intervention is financially out-of reach for most children in low-income communities, and many times the school is

left to “deal with the problem”. Most classes are too big for teachers to give special attention and provide help for these children in mainstream schools. They are therefore unable to provide necessary programmes for children diagnosed with ADHD. By teaching learners to recognize the attentional demands of their sport or movement as well as providing ample practice opportunities, practitioners such as physical education and classroom teachers can help sharpen their attentional switching skills and thus increase performance capability (Coker, 2004).

In a sense this study is an investigation to determine whether an individualised perceptual-motor and attentional development programme, delivered by a qualified physical education teacher or paediatric sport scientist, can assist children with attentional and concentration development; as well as increased motor proficiency, aiding them in their daily living.

Methodology

An evaluative case study method was followed. The children who participated in the study were involved in a four week baseline period of the programme. The Purposeful Play programme was presented for six weeks, which consisted out of 6 lessons per individual. Individualised sessions of 30 minutes were presented to those partaking in the study. After the six week intervention programme, a post-test of the Bruininks-Oseretsky Test of Motor Proficiency (BOTMP) Short Form was done; as well as two week post-programme ADHDT, observation by the researcher and The Attention-Deficit/Hyperactivity Disorder Test (ADHDT) by the teachers and parents of the children; and compared to their baseline and pre-test scores.

Limitations

- Some of the limitations to the study were that there were only 30 minutes available per session over a six week period, as some children take longer to adapt to a session or programme.
- Each child is unique and may take longer than others to settle into a session.

- Teacher and parent cooperation is critical to the completion of the assessment instruments.

Definition of Terms

Physical Education: Physical education is an educational process, which aims to enhance total human development and performance through movement and the experience of a range of physical activities within an educational setting.

Perceptual- Motor Programme: Perception is the meaning the brain gives to a certain sensation sent to the brain by the sensory nervous system, produced by the different senses. Perceptual development is therefore not just the development of the senses but the development of the effectiveness and efficiency of the brain to relay and give meaning to stimuli from the sensory systems (Pieterse, 2007).

Purposeful Play: The programme focused on specific "purposeful" outcomes within a playful and not intimidating environment. Hence the feeling of playful and playing for enjoyment deriving pleasure from effort and feelings of accomplishment as earlier stated by Thomas, Lee and Thomas (2008). A perceptual- motor programme where gross motor skills were used to develop the motor proficiency and gross motor abilities of the children in the study, by participating in a perceptual- motor programme. A Perceptual- motor programme focuses on the development of a child's important senses, namely: Body Awareness, Proprioceptive, Vestibular, Visual, Auditory and Tactile Systems.

Summary

Chapter one was a brief description of how the program was set out and implemented. Because the researcher is a Sport scientist the focus of the program is based on the effect of gross motor development in children, the Purposeful Play Programme is therefore based on perceptual- motor development. Chapter two will focus on what attention is, how it is seen in children, delays and deficits in attention and concentration and previous studies how these delays and deficits have been addressed. One of which is ADHD.

Chapter 2

Review of Literature

Because the intervention programme implemented in this study was a type of movement education programme, this review of literature is structured to first present attention as it is defined in the motor learning/motor performance body of knowledge. With this definition as a point of departure, literature related to ADHD specifically is reviewed in order to gain an understanding of the diagnostic criteria and the behavioural signs that indicate a child may have ADHD. The purpose of the third and fourth sections is to identify guidelines that may help with decisions about the content and methods for the implementation programme in this study. The third section identifies teaching strategies that have been associated with ADHD intervention programmes, and the fourth section presents the results of previous research describing relationships that have been found between motor performance and ADHD.

Theoretical Approaches to Attention

In their review of literature about the process of attention related to motor learning and performance, Janelle, Duley and Coombes (2004) noted that despite the vast amount of research completed in a wide variety of disciplines, a comprehensive understanding of attention from a scientific perspective has yet to be produced. They described three phases in the historical development of theories of attention in motor learning and performance, as follows: Attention as a filter, attention as a limited resource and attention as a skill (see Figure 2).

Attention as a Filter

Coker (2004) reported that early theories of attention stated that individuals were subjected to a continuous flow of stimulation, and that the flow was controlled at some point by an attentional filter. The function of the filter was to determine what stimuli would be processed further and what would be ignored. It was hypothesised that the stimuli selectively passed through the filter were then sent along in a serial fashion for further processing in the brain.

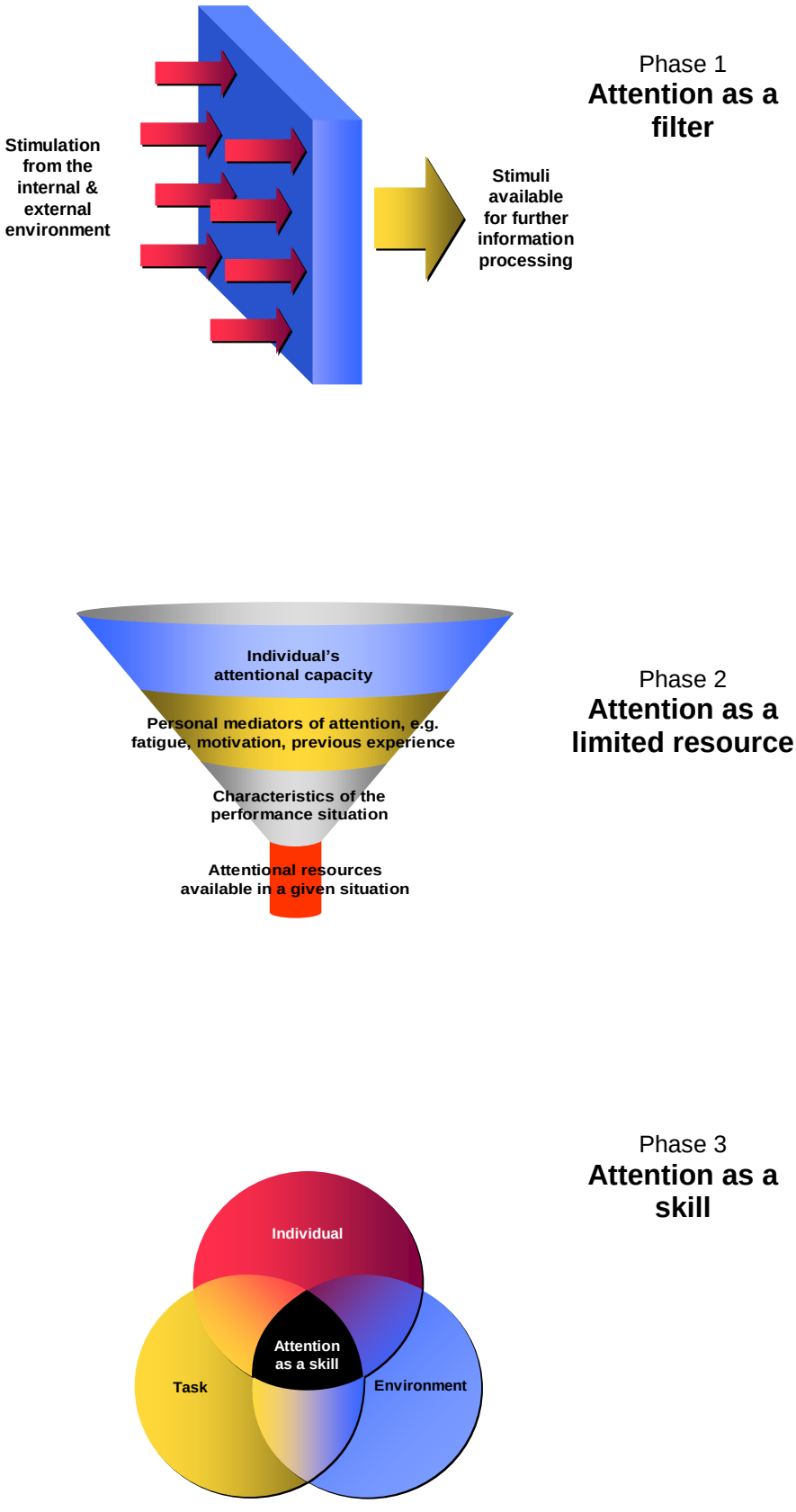

Figure 2

The phases of historical development of theories of attention in motor learning and performance

The idea that attention may operate as a kind of filter was found to be compatible with the information processing approach to describing motor learning and performance (Coker, 2004). In this approach, an initial process of sensation precedes the determination of the meaning of the stimuli, also called the process of perception. Janelle *et al.* (2004) explained that a filtering mechanism would be quite functional because the human gathers sensory input from such a wide variety of sources that the volume of sensory stimulation could overwhelm the system. An attentional filter could prevent the system from being overloaded with information. If the attentional filter was operating well, irrelevant cues could be blocked from further processing and only relevant cues would be used to formulate perceptions. Coker (2004) labelled the theories that conceive of attention as a filter the bottleneck theories because they all refer to a reduction in the amount of stimulation allowed into the information processing system.

Boutcher (2002) noted that one of the problems with the filter approach was the inability to explain exactly how the filtering process worked. For example, it was difficult to explain how an individual could consciously control the filtering process and decide upon what to focus and what to ignore. He associated the emergence of interest in the role of attention in motor learning and performance among sport psychologists with the second phase of theoretical development. In the second phase, attention was defined as a limited resource or limited capacity of the information processing system.

Attention as a Limited Resource

According to Janelle *et al*. (2004) the limited resource theories explained both the conscious and unconscious control of attention in terms of the attentional capacity of each individual. The attentional resources available in any particular situation were defined as a product of the current attentional capacity of the individual, which was affected by his/her psychological and physical state as well as by the specific attentional demands of that particular situation. They emphasized that limited resource theories often used the language of economics, for example, they referred to the processes of “paying attention” and “investing effort.”

Boutcher (2002) identified two characteristics of attention that he felt supported the limited resource theories:

1. There appears to be a limit on the amount of information of the number of cues to which someone can attend at a specific time. When this limit is exceeded, a competition for attentional resources occurs, which usually results in a reduction in the speed and quality of the performance (Coker, 2004). There is disagreement about the capacity to deal with this volume of information. Fixed-capacity theories suggest that attentional resources are relative stable in an individual and attentional capacity of an individual remains similar across a variety of different tasks. Undifferentiated capacity theories provide a more flexible view of attention and suggest that an individual's attentional capacity may change as task requirements change or the performance environment changes.

2. Individuals appear to have the ability to shift their focus of attention from one source of information to another and from one task to another in order to accommodate this limited capacity. Sport psychologists proposed that the ability to shift attention from one source of information or from one task to another was dependent on the knowledge of the individual (*e.g.* knowing where to look and knowing what to look for) as well as his/her psychological state (*e.g.* motivation, fatigue, stress) (Coker, 2004). The ability to shift attention is critical in many sport performance situations. An individual who has a limited capacity to shift attention will often have difficulty performing complex tasks in which the important cues appear quickly and the sequence for reading those cues is important.

Limitations in attentional capacity were hypothesised to be caused by interference in either the structure of the information processing system or in the capacity for processing of the central nervous system (Boutcher, 2002). Structural interference was proposed to occur when two tasks are performed at the same time, and they use the same receptor or effector systems. Capacity interference was proposed to occur when two tasks compete for the same perceptual, decision-making and/or memory processes at the same time. In either case,

performance was thought to be negatively affected whenever the attentional capacity of the individual was exceeded.

Coker (2004) identified one theoretical weakness of defining attention as a limited capacity to be the lack of importance it assigns to the changing attentional demands for a given task. Practitioners contended that the attentional demands of the environmental as well as the attentional demands of a specific task were important considerations in motor learning and performance contexts (Wulf, 2007). Because practitioners manipulate the environment and/or the task demands in order to have an influence on the performance of an individual, they were seeking a theory that would include the interaction of the environment, task and individual when defining the process of attention. Coker (2004) stated that some modifications of the limited resource theory might accommodate this interaction. For example, two tasks could be successfully performed simultaneously provided that the demands they put on the individual's attentional capacity did not exceed the attentional resources available. As either the environmental or task complexity increased, however, the attentional demands required would undergo a corresponding increase, thus reducing the amount of attentional space available for the tasks.

Janelle *et al*. (2004) found that recent advances in understanding motor learning and performance emphasize the interaction of individual, task and environment as a dynamic system in which the performer continuously and re-organizes his/her motor performance. From this perspective, attention functions as an individual constraint that shapes performance. Attention can also operate as a rate limiter if the individual does not appear to be able to successfully meet the attentional demands of a task in a particular environment. One implication of this interpretation is that attention is regarded as a skill that is not only situation-specific, but also a skill that can be learned.

Attention as a Skill

Regarding attention as a skill is not a new approach, although the dynamic systems theory has only been recently applied in motor learning and performance. Statton (1978) encouraged teachers to look at both task requirements and environmental demands when evaluating children's ability to control their selective attention. Coker (2004) commonly referred to selective attention as the skill of

dividing attention and the skill of shifting attention between tasks. She also noted that many motor learning theorists use the term “automated control” when referring to improvements in an individual’s capacity to control his/her attention. Based on the increasing evidence that supports the application of dynamic systems theory, Janelle *et al*. (2004) concluded that regarding attention as a skill includes four important concepts that practitioners deal with on a regular basis: selective attention, the automated control of attention, the effect of level of arousal on attention, and the relationship between attention and motor skill performance.

Selective Attention

Selective attention has been defined as the ability to attend to or focus on one specific item in the midst of countless stimuli (Coker, 2004). It includes the ability to focus on the stimuli that are important for success and to ignore unimportant stimuli. Because different tasks and different environments often place different attentional demands on the performer, success may depend on the performer’s ability to control his/her attentional focus. In these situations, performers may continually shift their attentional focus throughout the performance from relevant cue to relevant cue, while ignoring non-important cues (Wulf, 2007). They also may develop the ability to scan and search the visual field in order to select only certain cues from the environment (Coker, 2004).

Automated Control

Boutcher (2002) stated that two related forms of cognitive processing appear to support attention. These two forms are control processing which requires effort and is slow and time consuming, and autonomic processing which is effortless, quick and efficient. Control processing is used to process new or changing information and is a slow process which takes up time and effort. Because it can be a conscious process it is often identified as a limiting factor on motor skill performance. Beginners as well as performers who are new to complex and changing sport situations appear to use control processing. Wulf (2007) defined autonomic processing as being fast, effortless and not under direct conscious control. The term “automated control” is often associated with proficiency in motor skill performance.

Alertness and Level of Arousal

The interaction among the task, individual and environment produces a state of alertness or level of arousal that can affect an individual's capacity to control his/her attention (Coker, 2004). Studies have shown that increased emotional arousal narrows the attentional field (Boutcher, 2002). For example, visual scanning and searching abilities are effected when the level of emotional arousal is high. Narrowing of the attentional field has been reported with increasing levels of arousal. This is not always a negative result. A narrow attentional field is helpful for a visual task such as aiming at a target, where the decrease will reduce the tendency pick-up and respond to peripheral stimuli.

Ziegler (2002) discussed attention and level of arousal in relation to stress and anxiety. For example, he noted that non-stimulating, low-arousal environments may lead to athletes' missing important task-relevant cues because they are under-aroused. He also related the concept of distraction to alertness and level of arousal. Task-irrelevant cues that distract/draw an athlete's attention are obvious problems for performance. Even a momentary loss of attention may have devastating results.

Attention and Motor Skill Performance

Although the idea that attention should be regarded as a skill is not fully developed from a theoretical perspective, it has become increasingly popular in the motor learning and performance literature (Janelle *et al*., 2004). Some improvements in motor skill performance may be associated with improvements in the individual's ability to control his/her attentional processes. Moran (1996) asserted that the development of motor skills is in large part dependent on the individual's ability to control his/her attention. For example, learning to how to focus attention on environmental cues such as the speed and rotation on the ball, is a challenge that must be met batters in cricket. Learning how to focus on internal cues such as body position when trying to hold a handstand, is another example of the role of attentional control in motor performance. Practicing to the point that the control of attention is automatic is important at the advanced skill level where conscious attention needs to be focused on strategies and making tactical decisions.

Moran's (1996) statement that attention has a central role motor skill learning has resulted in the development of sport-specific attentional control development activities as a normal part of training programmes (Janelle *et al*., 2004). If attention is regarded as skill, then it is logical to propose that improvements in the control of attention could be possible with appropriate practice of certain tasks in certain environments. Regarding attention as a skill also brings up the possibility that children who struggle to control their attention, might benefit from participation in movement activities designed to help them improve their atttentional control. This could be an exciting direction for intervention programmes specifically for children who show signs of ADHD.

ADHD

Mash and Wolfe (2005) described ADHD in its most general sense to be a serious disruption in an individual's ability to control his/her attention. Children who have been diagnosed with ADHD display persistent age-inappropriate symptoms of inattention, distractibility, impulse control and hyperactivity (Bester, 2006). Of course, many of these symptoms may occur from time to time in all children. However, in children with ADHD, the symptoms interfere with active daily living because they occur frequently and in several settings, such as at home and at school.

Types of ADHD

ADHD was categorised by Mash and Wolfe (2002) into two general types of disorder: Inattention and hyperactivity/impulsivity. Mash and Wolfe (2002) associated inattention with children who find it difficult to sustain mental effort during work or play. These children may have difficulty focusing on any one thing, following instructions and completing tasks. Although they may have some success attending to things they enjoy, they often have great difficulty focusing on new tasks or less enjoyable activities. Common complaints about inattention are that the child does not or won't listen, follow instructions or finish chores or assignments.

Flick (1998) observed that inattentive children may be able to focus during one-on-one situations, but when they are in complex environments, such as a noisy classroom, they experience difficulties. The signs of ADHD among these

children might not be noticed until they begin school. Because they have problems attending to details and are easily distracted by other events, they may find it difficult to finish their schoolwork. They may avoid tasks that require sustained mental effort, make careless mistakes and appear disorganised. They may even appear not to be listening.

Harvey and Reid (2003) identified a subgroup within inattentive children of individuals who are distracted by their own internal thoughts and sensations, rather than by external stimuli. These children may rarely cause any disturbances in class, but they consistently underachieve.

Hyperactivity (overactive behaviour) can take many forms. Mash and Wolfe (2002) reported that hyperactive children are extremely active, but unlike other children with high energy levels, they do not seem to accomplish very much. Their actions are excessively energetic and intense, but often inappropriate and not goal-directed. Hyperactive children can be described as being “on the go” (Harvey & Reid, 2003). Sitting still through a class lesson can be impossible for them. They may fidget, squirm, and even run about the room. They may aimlessly touch things and make noises, such as tapping a pencil or talking incessantly.

Impulsivity was described by Flick (1998) as an extreme difficulty in controlling reactions as well as linking thoughts to actions to consequences. Although impulsive children may be aware of right and wrong and be able to repeat the rules of the classroom or home, they seem to think after they act. It seems to be a struggle for them to regulate their behaviour in relation to the demands of a particular situation. As a result they may blurt out inappropriate answers to questions that have not yet been completed. Children who are impulsive typically find it difficult to wait and take turns. Mash and Wolfe (2002) reported that behavioural impulsivity is one predictor of antisocial behaviour and is considered to be a sign of risk for personal conduct problems.

Behavioural problems, poor school work and learning difficulties may be the first indicators of the need to evaluate a child (Harvey & Reid, 2003). An assessment usually includes a complete evaluation of the child’s medical, psychological, educational, and behavioural history by a team of specialists that may involve audiologists, speech- language pathologists, paediatricians, psychologists, special educators, psychiatrists and neurologists. Although there

are established criteria and common behavioural indicators (soft signs) that ADHD may be present, Harvey and Reid (2003) reported that no single method has been accepted as the definitive method for the diagnosis of ADHD. Diagnosis is usually based on combinations of the presence of age-appropriate symptoms, the results of clinical tests, and observational reports of the child's behaviour.

Diagnostic Criteria

The Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) of the American Psychiatric Association (2000) identified five specific diagnostic criteria that must be met for a diagnosis of ADHD:

1. Six or more the behavioural symptoms of ADHD must be evident for a minimum of six months.

2. Behavioural symptoms must appear before the age of seven years.

3. Behavioural symptoms must be exhibited in at least two different settings.

4. A significant impairment in social, academic, or occupational functioning must be observed.

5. The behavioural symptoms must not be better explained by another disorder.

Although the identification of these five criteria provides the framework for the diagnosis ADHD, Harvey and Reid (2003) explained the inclusion of additional information, such as behavioural soft signs, as critical in the final determination of whether a child has ADHD. They put forward two reasons for the inclusion of soft signs in the diagnostic process:

1. Because there is a high rate of co-morbid disorders that appear in some children with ADHD, it is often difficulty to distinguish between the symptoms that are evidence of ADHD and those that indicate the co-morbid disorder. These accompanying difficulties may include Developmental Coordination Disorder, oppositional defiant disorder, conduct disorder, anxiety and depression. Learning difficulties are also common, although most children with ADHD seem to have normal intelligence.

2. Because the exact causes of ADHD have yet to be identified, it is impossible to be certain about which additional criteria and behavioural soft signs should be used to confirm the diagnosis.

Characteristics of ADHD (Soft Signs)

Most children with ADHD have been found to display symptoms of both inattention and hyperactivity/impulsivity, although one or the other behavioural pattern is often predominant. This realisation led to the identification of three variations of ADHD (APA, 2000):

1. ADHD *Predominantly Inattentive Type* (ADHD-PI).
2. ADHD *Predominantly Hyperactive-Impulsive Type* (ADHD-HI).
3. ADHD *Combined Type* (ADHD-CT).

Although what Flick (1998) referred to as the triad symptoms of inattention, hyperactivity and impulsivity, is often used to describe the common characteristics of ADHD, there are other behavioural characteristics that are signs that a child may have ADHD tendencies. For example, Mash and Wolfe (2002) identified the following behaviours as the "soft signs" or possible indicators that a child may be affected by ADHD:

- Disorganisation: This sign may be manifested in children's physical appearance (*e.g.* clothing), in the way they keep track of their belongings and when preparing for projects and test. This lack of organization contributes to their difficulty in completing tasks.
- Poor peer or sibling relations: Despite a strong desire to be accepted by others, some children seem to misread social cues and impulsively act in socially inappropriate ways. This can include aggressive behaviour. Socially awkward or hurtful behaviours can alienate them from their peers and also from their siblings.
- Poor self-concept or self-esteem: Children with ADHD tend to struggle in achievement situations, and as a result many become sensitive emotionally to their difficulties and failures. They are not only hard on themselves but do not always know how to handle criticism and negative

feedback from others. As they become increasingly doubtful about their abilities, they may withdraw and stop trying.

- Sensation-seeking behaviour: Children who are inattentive may seek high-risk and even dangerous activities in an effort to find something that will externally capture their attention.

- Daydreaming: Children who are inattentive may totally retreat from any risk behaviours and become very withdrawn.

- Poor fine motor coordination: Many children with ADHD tendencies do have problems with fine-motor coordination, which makes many academic tasks difficult to complete. Interestingly, they may have very little difficulty with gross-motor coordination and may actually excel in some sports. In such cases, their success on the sport field may serve as a compensation for their perception of failure in the classroom.

- Memory problems: Repeated difficulty in remembering directions for tasks is another possible sign that ADHD may be present. It is not known if these memory difficulties should be attributed either to a memory dysfunction or to the ease with which the child is distracted when instructions are given.

- Persistent obsessive thinking: Difficulties in letting to of an idea/thought or moving along to a new topic, is also a soft sign that a problem with attentional control may be present.

- Inconsistency: Inconsistency is most often highlighted as the single most recurring sign of that ADHD may be present. The child may be described by parents and teachers as having good days and bad days.

When looking at this list of behavioural characteristics or soft signs that may indicate ADHD, it is clear that children who manifest the symptoms of ADHD as well as a combination of several of these signs, will have serious and persistent problems meeting the challenges of day to day living.

Causes of ADHD

Majorek, Tuchelmann and Heusser (2004) presented ADHD as the interaction among biological systems of the individual, the psychological systems of the individual and the environmental factors that impact on his/her life (see Figure 3). Their reason for taking this integrated approach was their contention that the current research on ADHD does not clearly support one aspect as the "cause." In their experience, they found that each individual's temperament determines how the condition manifests itself, and each individual's environment influences how ADHD presents at any given time. Pughe-Parry (2007) supported the approach that ADHD is most accurately thought of as an interaction among the individual and the environment. For example, they concluded that in some cases environmental factors may contribute directly to the cause of ADHD and that in other cases, environmental factors may aggravate neurological factors, causing a wide range of psychological problems. There are also co-morbid conditions that make it still more difficult to determine how ADHD is manifested in a particular individual's behaviour.

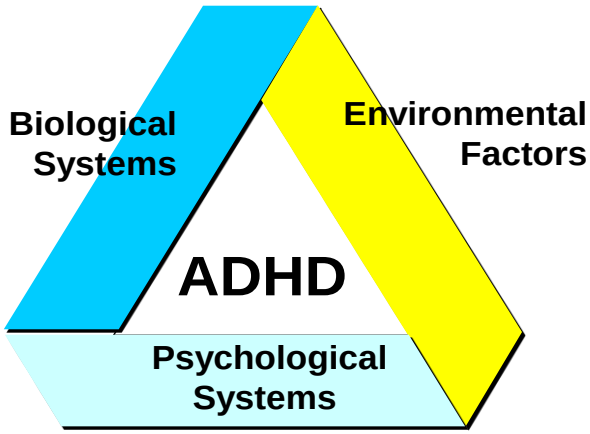

Figure 3

ADHD as an interaction among biological, psychological and environmental considerations

Biological Systems

Furman (2005) reported that the consensus opinion in the United States is that ADHD is a neurological disorder, despite the fact that there is no scientific evidence to support this conclusion. Gilliam (1994) attributed this assumption to the common use of terminology such as “minimal brain dysfunction” when ADHD was first identified as a disorder. Because people who acquired mild brain damange in accidents were often left with behavioural problems such as inattention and impulsivity, the link may have been made to brain involvement when inattention and impulsivity were observed in children when no apparent cause was evident. Mash and Wolfe (2005) did report that neurologists described a reduced blood flow to the cerebellum and cerebral cortex for children diagnosed with ADHD compared t(o those without ADHD, but more reserach was recommended.

Stolzer (2009) provided an alternative rationale for this belief in the medical origins of ADHD in his critique of the extraordinarily high rates of medication adminstered to American children who show signs of ADHD. He noted that the pharmaceutical industry has a huge economic investment in the use of medication for ADHD, estimating that as many as 99% of the American children diagnosed with ADHD may be on daily doses of medication. He contended that commercials and adverstisements promoted the medication of chidlren with ADHD and encouraged teachers and parents to regard medication as a solution to their behavioural problems.

The possiblity of a genetic origin or at least influence on the occurence of ADHD in some children appears to have some scientific support. Barkley (1998) reviewed the incidence of ADHD in families and found the rate of occurence was as high as 35% in some of the families with members with ADHD. Another biological consideration is that of gender differences in relation to the incidence of ADHD. The vast majority of children diagnosed with ADHD are boys, which introduces the possiblity that the disorder may be brain-based (Stolzer, 2009).The gender differences between the male and female brain have been documented, although the origins of those differences is debated. Soffer, Mautone and Power (2008) cited research that found that internalising and withdrawal behaviours were

present more often for girls than boys with ADHD. He recommended that research with larger samples of girls with ADHD is needed to describe more precisely the issues unique to girls that may require special adaptations during assessment and interventions. When conducting reserach on genetic and gender factors, it will be necessary to go beyond investigations into the functions of the biological/physical systems and include the psychologial systems and environmental factors as well.

Psychological Systems

The strong relationship between psychological functions and ADHD is widley supported. Gilliam (1994) noted that problems of self-esteem, mood swings, and low tolerance for frustration and temper tantrums were common among children with ADHD. Barkley (1997) proposed that a primary deficit in the psychological ability to inhibit behaviour was the central mechanism underlying many of the related behavioural control difficulties shown by children with ADHD. He also suggested that children with ADHD would respond well to immediate reinforcement of behaviour, but would not respond well if reinforcement was delayed. Majorek *et al.* (2004) were convinced that problems in the development of psychological self-regulation skills were central to ADHD.

The ability to control attention is another psychological function that has been identified as a problem area for children with ADHD. The results of selective attention studies on children with ADHD have been mixed. In her review of cognitive abilities in children with ADHD, Douglas (1988) listed several selective attention tasks on which children with ADHD displayed deficits, and some on which they did not. For example, children with ADHD had difficulty inhibiting responses to irrelevant stimuli and ignoring irrelevant stimuli. However, they performed adequately on tasks requiring recall of spatial locations. Brodeur and Pond (2001) also found that children with ADHD demonstrated performance deficits under some selective attention conditions but not others. Difficulties with selective attention could be one reason why some children with ADHD are accident-prone (Mash & Wolfe, 2002).

Environmental Factors

The academic problems experienced by many children with ADHD have been related to their inability to control their attention and their difficulty working

within specific time frames (Gilliam,1994). This can lead to a school environment that contributes to the behavioural problems of children with ADHD. Stolzer (2009) even suggested that the school environment contributes to children's attentional control difficulties. He claimed that the premium placed on sedentary learning and compliant/conforming behaviour in the school environment actually penalises active and energetic children to the point where some of them are referred for assessment for ADHD. He even suggested that many children have been carelessly placed on medication to control their assertive behaviours in an effort to create a controlled school environment.

Mash and Wolfe (2002) confirmed that children with ADHD do experience school performance difficulties, reflected in lower marks, failure to advance in grade level and even placements in special education classrooms. Problems with specific learning areas like reading and mathematics have been identified. Speech and language impairments and difficulty in using language have also been reported. Flick (1998) added that children with ADHD experience numerous interpersonal problems with parents, siblings and teachers, as well as peers.

Co-morbid Conditions

Tirosh, Perets- Dubrovsky, Davidovich and Hocherman (2006) stated in their research that almost 50% of children with a diagnosis of ADHD are reported to have additional motor deficits, especially those who have a co-morbid attentional and motor deficits seems to have problems with attention, motor control and perception. The problems children show with poor fine motor abilities cannot be attributed to deficits in inattention and concentration but is rather linked to motor control problems. Deficits in visual-motor tracking have been described in clumsy children as well as in children with attentional deficits. Therefore, given that visual-motor tracking in clumsy children is found to be of low spatial and temporal quality one can expect similar findings in children with ADHD as a result of the co-morbid impairment.

One of the reasons that the development of programmes for children with ADHD is so challenging is that as many as 80% of children with ADHD may have a co-morbid disorder (Surgeon General, 1999). When a child with ADHD shows any sign of co-morbid disorders, the effects of the co-morbid disorder must be considered as well as the interaction of the disorder with ADHD. The programme

leader should then plan the individual sessions accordingly, finding behavioural and teaching strategies that will best suit the needs of each child as an individual case

The most common co-morbid disorders experienced by children with ADHD were identified by practitioners and other health and wellness professionals (Surgeon General mental health report, 1999; Bester 2006) to be the following:

- Developmental Coordination Disorder (DCD).
- Asperger's Syndrome.
- Oppositional Defiant Disorder (ODD).
- Anxiety Disorder.
- Depression.
- Gilles de la Tourette Syndrome.
- Learning Problems.

Developmental Coordination Disorder (DCD)

The American Psychiatric Association in the Diagnostic and Statistical Manual of Mental Disorders defines DCD as a marked impairment in the development of motor coordination that is not attributed to intellectual impairment and cannot be traced to a physical disorder (APA, 2000).

Children with DCD have mild to moderate motor impairments (APA, 2000). They form a heterogenous group and the motor coordination deficits they experience are quite varied. Their coordination deficits may be in gross motor skills, fine motor skills, or both. Some children may have difficulties with discrete finger-tapping, others with eye-hand- coordination. Some may have poor balance, and others may have reached developmental goals at a much later stage than their peers (Polatajko & Cantin, 2006).

Asperger's Syndrome

Griffin *et al.* (2006) described Asperger's Syndrome as a disorder that is either at the higher functioning end of the autism spectrum or a separate autism-related disability. Autism is three to four times more common in boys than in girls and touches the lives of almost one percent of school aged-children. These children often have motor problems and are overstimulated by crowded rooms and cluttered or overwhelming visual situations. Through grammatical, their speech may sound peculiar due to abnormalities of inflection and a repetitive pattern. Clumsiness may be prominent both in their articulation and gross motor behaviour (Griffen et al, 2006; Kennedy 2002)

The Diagnostic and Statistical Manual of Mental Disorders (DSM IV, 2000) defined Asperger's Syndrome in terms of the following characteristics:

- An impairment in social interaction.
- Repetitive and restrictive stereotyped patterns of behaviour and interests.
- Significant social, occupational, or other impairments in functioning (unrelated to language or cognitive difficulties, which do not appear to affect people with Asperger's Syndrome).

Kennedy (2002) provided anecdotal support for the similarities between the symptoms of ADHD and autism. Her journey began as an effort to help her sons, and then became a mission to increase awareness about the similarities between ADHD and autistic spectrum disorders, especially Asperger's. Having the uncommon experience of having three textbook cases of ADHD in her home, she found that her third son had been misdiagnosed as having ADHD with co-morbid Oppositional Defiant Disorder (ODD). The only treatment offered to her son was medication for ADHD, which proved to be ineffective.

Oppositional Defiant Disorder (ODD)

By the age of seven, approximately half of all children with ADHD also meet the criteria for ODD (Bester, 2006). The majority of these children are boys. Children with ODD overreact, lashing out at adults and other children. They are stubborn, short-tempered and combative.

Children diagnosed with ODD lose their tempers, argue, and refuse to obey rules or respond to requests (Bester, 2006). They usually blame others for their mistakes and can be vengeful. These behaviours also tend to appear when a children with ADHD experience frustration and anger as an outcome of repeated failures at task performance. According to Mash and Wolfe (2002), 30% to 50% of children with ADHD eventually develop conduct disorder (CD), a more severe version ODD. Children with CD are at high risk of getting into serious trouble at school or with the police. Their behaviours may include anti-social actions such as fighting, cheating, stealing, destroying property, and using illegal drugs. ADHD is one of the most reliable predictors of both ODD and CD. Children showing CD need a multidisciplinary team included in their treatment (Mash & Wolfe, 2002).

Anxiety Disorders

About 25% of children with ADHD, usually younger boys, experience excessive anxiety (Mash & Wolfe, 2002). These children worry about being separated from their parents, trying something new, taking tests, making social contacts, or visiting the doctor. They may feel tense or uneasy and constantly seek reassurance that they are all right. Because their anxieties are unrealistic, more frequent, more intense than normal, they have a negative impact on the child's thinking and behaviour.

Depression

Children with ADHD experience more depression than those without ADHD (Mash & Wolfe, 2002). As many as 20% experience depression, and even more eventually develop depression or another mood disorder by early adulthood. These youngsters feel hopeless and overwhelmed that they are unable to deal with everyday life. Depression lowers self-esteem, increase irritability, and disrupts sleep, appetite, and ability to think.

Gilles de la Tourette Syndrome

This syndrome is generally known as Tourette's Disorder. In Tourette's Disorder ADHD symptoms manifest in combination with obsessive compulsive behaviour and/or muscular spasms (Bester, 2006; Mash & Wolfe, 2002). A diagnosis of Tourett's Disorder is made only when uncontrolled sounds, as well as muscle spasms are present for longer than six months.

Learning Problems

Problems learning to read and spell abilities are often manifested in children with ADHD. Problems in computation ability are also common. Most children with ADHD experience severe academic difficulties in school regardless of whether or not they have a specific learning disorder (Bester, 2006; Mash & Wolfe, 2002).

Intervention Strategies

When ADHD is defined as a multi-dimensional disorder consisting of an interaction of biological/physical, psychological and environmental factors, multiple approaches to intervention and treatment deserve consideration (Harvey & Reid, 2003). In the following sub-sections, only a brief presentation is made of biologically-based interventions since those kinds of interventions are not the focus of this study. Because current theories in motor learning regard attention as a skill that can be learned, movement-based intervention programmes include the development of psychological self-regulation skills and the manipulation of environmental factors. This approach is compatible with the Majorek *et al.* (2004) suggestion that efforts to address ADHD regard gaining control of attention as a cognitive (psychological) strategy that can be learned. For this reason, the sub-sections dealing with psychological and environmental interventions will receive a greater emphasis.

Biological Interventions

Biological interventions for children with ADHD are usually equated with medication. Stolzer (2009) reported that the majority of children who are diagnosed with ADHD in the United States are prescribed psycho-stimulant drugs to decrease their disruptive behaviours, increase their compliance and improve their ability to sustain their attention. Beyer (1999) completed research on the motor performance of children with ADHD and found that those who were not medicated had more difficulty paying attention to relevant cues in performance situation. However, both medicated and non-medicated children performed at lower levels of proficiency than children who did not have ADHD.

Stolzer (2009) was adamant that medication is a tragic option for children with ADHD. He cited many documented side effects, including headaches, suicidal feelings and Tourette's syndrome. He also noted that ADHD medications have been associated with personality changes, depression, insomnia, fatigue, liver dysfunction, angina and growth suppression. He noted that the Food and Drug Administration classified one of the most common ADHD medications (methylphenidate) as a Schedule II drug, the same classification given to morphine, opium and barbiturates, because it is highly addictive and can produce severe withdrawal symptoms.

Although medication may be an option, the potential implications of its use on children's health and physical well-being provide sufficient motivation to look for less invasive and more self-empowering options for children with ADHD. Psychological and environmental interventions can offer such options.

Psychological Interventions

Some psychological interventions have been development as complete programmes. For example, Engelbrecht (1989) identified the acquisition of effective strategies for learning as one of the central challenges facing educational psychologists in their efforts to help ADHD children meet the academic and social demands of a regular school programme. She explored to potential of Cognitive Control Therapy to help children learn the psychological skills they need to help them manage, regulate and adapt to environmental information, as well as learn how to control their feelings and channel them in productive directions. Other psychological interventions have consisted of proposals of psychological methods that may be used to encourage children to self-regulate their behaviour. For example, AAP (2001) recommended a collection of behavioural management techniques when working with children with ADHD.

Cognitive Control Therapy

Cognitive Control Therapy (CCT) can be traced to the early work of Santostefano that was focused on identifying commonalities in the underlying strategies that children used to avoid information or to approach, select and

process information (Santostefano, 1978). He proceeded to develop the Cognitive Control Battery, designed to measure three discrete non-verbal cognitive functions that play a fundamental role in learning and adaptation (Santostefano, 1988):

1. Scanning.
2. Attending selectively.
3. Comparing images of past information with present perceptions.

Santostefano (1984) also produced a framework of different kinds of tasks that could guide therapists in the design of programmes to help individuals gain control over their own non-verbal cognitive functions of scanning, selective attention and perception. The six kinds of task were:

1. Body-ego tasks: Activities can be designed to promote use of the body to represent various objects. These body-ego tasks help a child differentiate clear body boundaries and a sense of body-self. For example, children can practice creating different body shapes, images and ways to use space. Progressions of tasks could include perceiving and describing the body in static positions, in dynamic positions and in static and dynamic relations to other objects.
2. Tempo regulation tasks: Activities can be designed to promote experiences performing tasks at different speeds, rhythms and on different pathways.
3. Focal attention tasks: Activities can be designed to promote visual scanning of the environment. For example, the child can practice tracking targets that move at different speeds and for different distances.
4. Field articulation tasks: Activities can be designed to encourage selective attention to selected cues in the environment. Distractions and complicated backgrounds can be introduced to make tasks more challenging.
5. Levelling-sharpening cognitive control tasks: Activities can be designed that require holding some image or information in the short-term memory in order to perform a task.

6. Equivalence range tasks. Activities can be designed in which a child learns to recognise the various attributes or characteristics of objects in order to group them into categories. It is possible that categories can be reformulated when attributes or characteristics are seen differently.

Behavioural Management Techniques

Strategies for shaping behaviour may also be effective in helping children develop self-management skills. When working with children with ADHD, the four behavioural management techniques presented in Table 1 are commonly recommended (AAP, 2001)

Table 1

Behavioural techniques recommended when working with children with ADHD

Technique	Description	Example
Positive Reinforcement	Provide rewards or privileges contingent on the child's positive behaviour.	Child completes a task and is then given time to play with a favourite toy.
Time-Out	Removing access to positive rewards or privileges following performance of inappropriate behaviour.	Child hits a classmate and is required to stop playing and instead must sit for 5 minutes on the sideline.
Response Cost	Withdrawing rewards or privileges following performance of inappropriate behaviour.	Child loses free time privileges for not completing homework.
Token Economy	Combining positive reinforcement and response cost - the child earns rewards and privileges contingent on performing desired behaviours and loses the rewards and the privileges contingent on undesirable behaviours.	Child earns stars for completing assignments and loses stars for calling out during quite time in class. He/she can "cash in" stars at the end of the week for prize.

Michel *et al.* (2005) examined the effects of positive reinforcement strategies on children showing signs of ADHD. They found that children in the ADHD group showed the greatest benefit from reinforcement when trying to learn how to inhibit impulsive reactions in a variety of situations. They also found that the more motivating the consequences of demonstrating self-control, the greater the improvements achieved by the children.

Effective teaching strategies may be regarded as a psychological intervention that may also involve modifications in the learning environment. In this sense, teaching is a combination of psychological and environmental interventions. Some of teaching strategies have been specifically recommended for supporting the development of children with ADHD (Bester, 2006; Munden & Arcelus, 1999; Flick, 1998).

- Provide verbal cues concurrently as child performs a task.
- Provide visual cues such as gestures.
- Provide auditory cues such as hand-clapping and making sounds.
- Provide demonstrations of the activity to be attempted.
- Encourage the child to establish a mental pre-set, *i.e.* take a moment to gather his/her mental concentration and focus before beginning an activity.
- Include tasks that call for attentional switching, *i.e.* first one source of information needs to be attended to, then another, then back to the first source.
- Establish a clear organisation by following set routines and sequences within each lesson.
- Provide frequent feedback.
- Provide immediate feedback.
- Individualise activities by modifying tasks based on how a child responds.

Environmental Interventions

In its most narrow sense, the environment can be considered to be the school environment. The environment is much broader than that, of course, and includes the family, the community and could even extend to socio-economic and political circumstances. The following emphasis on various aspects of the school environment is a reflection of the focus of this study.

The Learning Environment

The various lists of suggestions for structuring an effective learning environment of children with ADHD focus on teacher behaviours that may contribute to a supportive climate. These suggestions can be compressed to a list of recommendations that appear in almost all of the pedagogical resources (Bester, 2006; Munden & Arcelus, 1999; Flick, 1998). Those recommendations included:

- Surround children with good role models.
- Follow set routines.
- Avoid distracting stimuli and sudden changes in their daily routine.
- Produce stimuli-reduced study areas.
- Maintain eye contact when giving clear and concise instructions.
- Check child's comprehension before beginning task and repeat instructions if necessary.
- Simplify complex directions and avoid multiple commands.
- Give only one task/assignment at a time.
- Modify tasks/assignments as needed.
- Give extra time for task as needed.
- Provide supervision and discipline.
- Provide encouragement. Keep in mind that children with ADD are easily frustrated.
- Teach child to use positive self-talk.

Links to the School

The American Academy of Paediatrics Subcommittee on ADHD published clinical practice guidelines for the treatment of school-aged children with ADHD

(AAP, 2001). They recommended that clinicians responsible for the diagnosis of ADHD should develop links with the schools in order to create a more supportive environment for the long-term management of ADHD. Included in the guidelines were the following:

- Providing accurate information about ADHD.
- Updating and monitoring each family knowledge and understanding on a regular basis.
- Counselling families about how they can respond to ADHD and making counsellors available to answer questions.
- Helping families set specific goals in areas related to the child's condition and its effects on daily activities.
- Linking families with other families with children who have similar chronic conditions as needed and available.
- Ensuring coordination of health and other services.

Research on ADHD and Children's Motor Performance

The motor performance of children with ADHD have been examined in studies that focus on the sensory and perceptual motor aspects, and the performance of fine and gross motor skills. Research has also been completed to determine the effects of participation in movement programmes on children with ADHD.

Perceptual- Motor Aspects

In a study by Iwanaga *et al.* (2006), scores on tests of equilibrium and postural control were notably lower for children with ADHD than for children categorised as normal. These findings are compatible with the role of the vestibular system in ADHD presented by Solan, Shelley-Tremblay and Larson (2007). They explained that an intact vestibular system is critical for full sensory integration, including the development of coordinated eye-movements. Delayed or

impaired vestibular development can lead to sensory integrative dysfunctions, such as slow vision processing and delayed acquisition of reading skills in primary school children. They also noted that problems with vestibular function have been associated with deficits in object recognition, spatial navigation, learning and memory. They concluded that not only could vestibular disorders have a negative impact on the ability to control attention due to the distracting influence of increased body sway and postural lean, but there also could be psychological effects. They specifically identified anxiety and depression as possible outcomes of vestibular dysfunctions that could negatively affect the cognitive resources available for information processing.

Beyer (1999) reported that children with ADHD often have difficulty performing visual-motor tasks. He observed that these difficulties could be the result of problems locating and sustaining attention on relevant cues in the environment as well as the tendencies to act impulsively. He also reported on research that showed that children classified as normal performed significantly better than both non-medicated and medicated children with hyperactivity on eight out of 10 motor learning tasks. All tasks required the abilities of visual tracking, manual dexterity, reaction time and response time. Based on his analysis of the data, he concluded that children with ADHD who are not medicated display deficiencies in their ability to pay attention to relevant cues in performance situations.

Tirosh *et al.* (2006) found a significant difference in the visual-motor skill performances of children with and without diagnosed ADHD. They specifically linked the motor performance deficits of the children classified as hyperactive to their lower scores on a visual tracking task. They concluded that learning how to control visual tracking performance was a worthwhile objective for programmes designed to help children with ADHD improve their motor performance.

Klimkeit *et al*. (2005) investigated the bimanual coordination in children with ADHD. Coordinated bimanual movement is the performance of two separate hand movements simultaneously. Although both children with ADHD and children in the control group could perform simple in-phase movements initially, the children with ADHD became significantly less stable in the maintenance of the in-phase relationship between the two hands over time.

Gross Motor Skill Performance

In a study completed by Beyer (1994), boys with ADHD who were under medication, had significantly lower scores on most items of the Bruininks-Oseretsky Test of Motor (BOTMP) than boys with learning disabilities (LD) who were not under medication. Beyer (1999) conducted a subsequent study to determine if there were any differences between the motor proficiency scores of boys with ADHD and boys with LD that could justify different approaches to designing their physical education programmes. Boys with ADHD scored significantly lower than boys with LD on tasks of bilateral coordination, strength, visual-motor control and upper limb speed and dexterity, as well as timed tasks of motor coordination.

Harvey and Reid (1997) described the fundamental gross motor skills and physical fitness of children with ADHD. Nineteen children between the ages of seven and 12 years old participated in their study. Their gross motor performance was measured using the Test of Gross Motor Development and their fitness by selected items from the Canada Fitness Survey. They found that the fundamental gross motor skills and physical fitness of children with ADHD were substantially below the averages established for their age level.

Klimkeit *et al.* (2005) compared the motor performance of children with ADHD on medication to those who were not on medication. They found that the children without medication had significantly slower reaction time but did not show any differences in movement execution time. They concluded that the source of motor performance difficulties for children with ADHD appears to be in the movement preparation phase rather than movement execution phase. This conclusion was compatible with their report that the significantly slower and less accurate motor performances of children with ADHD was often related to their inattention and impulsivity during planning rather than executing movements. They also found that children with ADHD performed at a lower level of proficiency than children without ADHD on measures of fine motor coordination such as drawing lines along fine curvilinear routes, copying and completing designs.

Participation in Movement Programmes

The need for early screening and evaluation of pre-school children to identify developmental lags, deficits, and/or other sensory and perceptual deficiencies that may interfere with children's ability to function in the school environment has been recognised for many decades (Platzer, 1976). It has been postulated that the general self-concept of children, who do poorly in gross-motor skills and rate low in self-concept, may be improved by successful experience in perceptual-motor activities, which in turn may positively influence performance on other types of tasks (Platzer, 1976).

Hougton *et al.* (2004) contended that the fundamental limitation effecting children with ADHD is one of behavioural inhibition. They concluded that difficulties with the inhibition of behaviour contributes to difficulties with other functions, such as the operation of working memory, controlling moods, motivation and arousal and the ability to break down and recombine sequences of behaviour into new responses. Their research compared the performance of boys with ADHD to those without ADHD on computerized laboratory- based games. The boys with ADHD took less time to complete the task when the game involved no working memory load and no distractions. However, they were also less accurate in their performance. These findings supported the observation that children with ADHD tend to carry out tasks impulsively in the quickest possible time but in doing so, often commit more errors. The researchers also implemented a computer-based training programme comprised of continuous performance tasks. They found that this programme facilitated the development of persistence among the boys with ADHD. They concluded that computer games should be explored as a means to help children to increase their ability to control their concentration and task persistence.

Michel *et al.* (2005) examined the effects of positive reinforcement on children struggling with signs of ADHD. They found that children in the ADHD group showed the greatest benefit from immediate reinforcement, suggesting reward accounted for a substantial amount of variation in inhibition. Highly motivating consequences (compared to a task with less motivating consequences) significantly improved response inhibition in children with ADHD, but not in children in the control group.

Summary

Although the idea that attention should be regarded as a skill is not fully developed from a theoretical perspective it has become increasingly popular in the motor learning and performance literature as earlier stated by Janelle *et a*l. (2004). The researcher feel strongly about this point and feels that it is possible that improvement in motor skill performance may be associated with an improvement in an individuals ability to control his/her attentional process if enough attention and focus is placed on the process over time.

The researcher feels that at times we tend to take for granted the fact that focussing one's attention is a natural process. Yes the ability and to focus and the capacity thereof does improve naturally over time with the growth process but the researcher feels that the ability to focus attention effectively is something that should be taught from a early age.

Therefore the researcher feels strongly about the statement made by Moran (1996) and Janelle *et al.* (2004) that if attention is regarded as a skill then to propose that improvement in the control of attention should be possible with approaches in certain tasks in certain environments.

Taking ADHD into account when the individual has a problem with focus and capacity in focussing attention for periods of times, it is even more important according to the researcher to teach these children how to focus attention effectively (as you would a skill). The natural process of attentional development should therefore not be taken for granted but be taught to these learners in a specific way with specific guidelines and outcomes. The researcher thinks that in doing this through or in conjunction with movement programmes may be very effective and beneficial to these individuals. Movement programmes seem like the more effective or beneficial choice to the researcher because of the more relaxed notion of physical activity and "play-like" environment these programmes seem to offer making the individuals feel more at ease and comfortable, therefore more open to possibilities.

One of the major concerns for the researcher about the effectiveness of any programme when considering attention as a skill may be the influence of diagnostic criteria and the co-existence of co- morbid factors with the existence of the ADHD spectrum.

The researcher feels that all programmes may not be effective for all children when taking into consideration the diagnostic criteria of each child as there is the possibility that not all diagnosis are objective at all times. It has happened in the case of Kennedy (2002) that a misdiagnoses was made and choice of treatment seemed ineffective in the end. At this stage no textbook diagnoses and treatment is set out there for all individuals showing signs of ADHD.

From there the question arises which of the existing signs and symptoms would you treat first and how. Which of the two conditions factors prevalence is the strongest will ultimately influence the choice of treatment programme you choose. Another concern that arises is that some characteristics or soft signs may seem stronger than other at times because each individual is unique and also influenced by environmental and social constructs within their unique environment. Hence, making the choice of suitable and most effective programme even more difficult. It is therefore important to remember that not all programmes are appropriate and effective for all individuals and the unique characteristics of all individuals and cases should be taken into consideration at all times.

The purpose of Chapter Two was first to describe how attention is defined as a skill in current motor learning literature. ADHD was then discussed as a disruption in attentional control that is associated with behavioural disruptions such as hyperactivity, inattention and impulsivity. ADHD was also defined as an interaction among biological, psychological and environmental systems, resulting in a variety of different approaches to addressing the disorder. However, by regarding attention as a skill, cognitive strategies for helping children learn to control their attention can be explored as options for educational programmes. The final section of the chapter reviews some of the educational strategies that have been implemented and some of the research that has specifically used movement programmes as the means for helping children develop attentional control. The following Chapter Three will present the methodology as well as the movement education programme implemented in this research.

Chapter Three

Methodology

This research will be implemented using an evaluative case study approach, making use of quantitative and qualitative data. Thomas and Nelson (2001) identified this approach as particularly helpful when working in problem areas in which there are currently no clearly defined models to guide professional decision-making.

Research Design

Case study designs are usually classified under qualitative research methods. There are at least five different types of qualitative research (Johnson & Christensen, 2004). These types include:

- Phenomenology, in which the researcher attempts to understand how one or more individuals experience a phenomenon.
- Ethnography, which is focused on describing the culture of a group of people.
- Grounded theory, an approach to developing a theory based on data collected by the researcher.
- Historical research, in which the researcher attempt to document and contextualise events that occurred in the past.
- Case study research, which generates a detailed account of one or more cases in relation to a particular focus.

According to Thomas and Nelson (2001), case studies are well-suited when insight into the characteristics of either a single individual or particular situation may be helpful in understanding a generic problem. Because case studies are so specific to an individual case, it must be accepted that their value is bounded by a particular programme, institution, time period, or set of events (Gliner & Morgan,

2000). In case study research, the researcher provides a detailed account of one or more cases. Although case study research usually relies on qualitative data, multiple methods are also used (Johnson & Christensen, 2004; Blanche & Durrheim, 1999; Strauss, 1987). In fact, case study designs are strengthened when multiple sources of evidence are used (Janesick, 1998).

Because this research involves an intervention programme, a particular kind of case study, the single-case experimental design was followed. A single-case experimental study begins with a baseline measurement of variables, and consists of a longitudinal collection of data during the period of intervention, followed by a post-assessment that also extends over a period following the intervention (Barlow & Herson, 1984). This is also described as the A-B-A design, in which the participants are assessed over time to establish a consistency in their behaviours, then the intervention programme (including a pre- and post-test) is implemented, then another period of assessment follows in order to determine if any sustained differences have occurred as a result of the programme. Visual interpretation of longitudinal data (e.g. graphical displays) is the most common form of analysis (Blanche & Durrheim, 1999).

Blanche and Durrheim (1999) stated that the number of cases to evaluate a programme is partly dependant upon the state of the theoretical development in the field. In a field where there is a strong body of existing theory an individual case may be sufficient to either verify or to challenge the theory. The decision about the number of cases also depends on how much detail can be gathered from each case. It may be necessary to study several cases in order to get a better sense of a problem area. Case studies do have limitations, such demonstrating the validity of information. Also, it is very difficult to establish any cause-effect relationships and generalizations should not be made from single case studies (Mouton, 2001; Blanche & Durrheim, 1999; MacPherson, Brooker & Ainsworth, 1999; Strauss, 1987).

In this study, five single-case experimental designs will be implemented with five children, all of whom show signs of ADHD and which have been formally diagnosed by medical professionals and doctors. Quantitative data will be gathered on their motor proficiency. Longitudinal data regarding their ADHD-

related behaviours will be collected over a 12-week period using a checklist, completed separately by their parents and their teachers. Additional quantitative data will be collected about the programme content in terms of frequencies of use of content areas and teaching strategies. Additional qualitative data will be gathered during the programme by means of a journal kept by the researcher for noting various aspects of the participants' experiences during the intervention programme.

Procedures

The following procedures were followed in the implementation of this research.

Selection of Instruments for Gathering Data

In order to gather data about each participant from multiple sources over a period of time, the following four instruments were used.

Bruininks-Oseretsky Test of Motor Proficiency

The researcher selected the Bruininks-Oseretsky Test of Motor Proficiency (BOTMP) Short Form to assess the motor proficiency of the participants. The BOTMP Short form was chosen because it is a well established and standardized test in the assessment of motor proficiency of children. The test has been used in previous studies for the testing of Motor Proficiency of children, including studies in South Africa. For example, Statham (2004) used the BOTMP in a study of the motor proficiency of children between the ages of six and 10 who had been diagnosed with ADHD in the Cape Metropole. The researcher also chose to use the BOTMP because it consists of tasks that are easy for children to understand, can be administered within a 15-minute period in a field setting, and it produces a single composite score for motor proficiency as well as individual scores for critical underlying variables that contribute to motor proficiency (See Figure 4).

The Short Form of the Bruininks-Oseretsky Test of Motor Performance (BOTMP Short Form) consists out of eight subtests. These consist of the following:

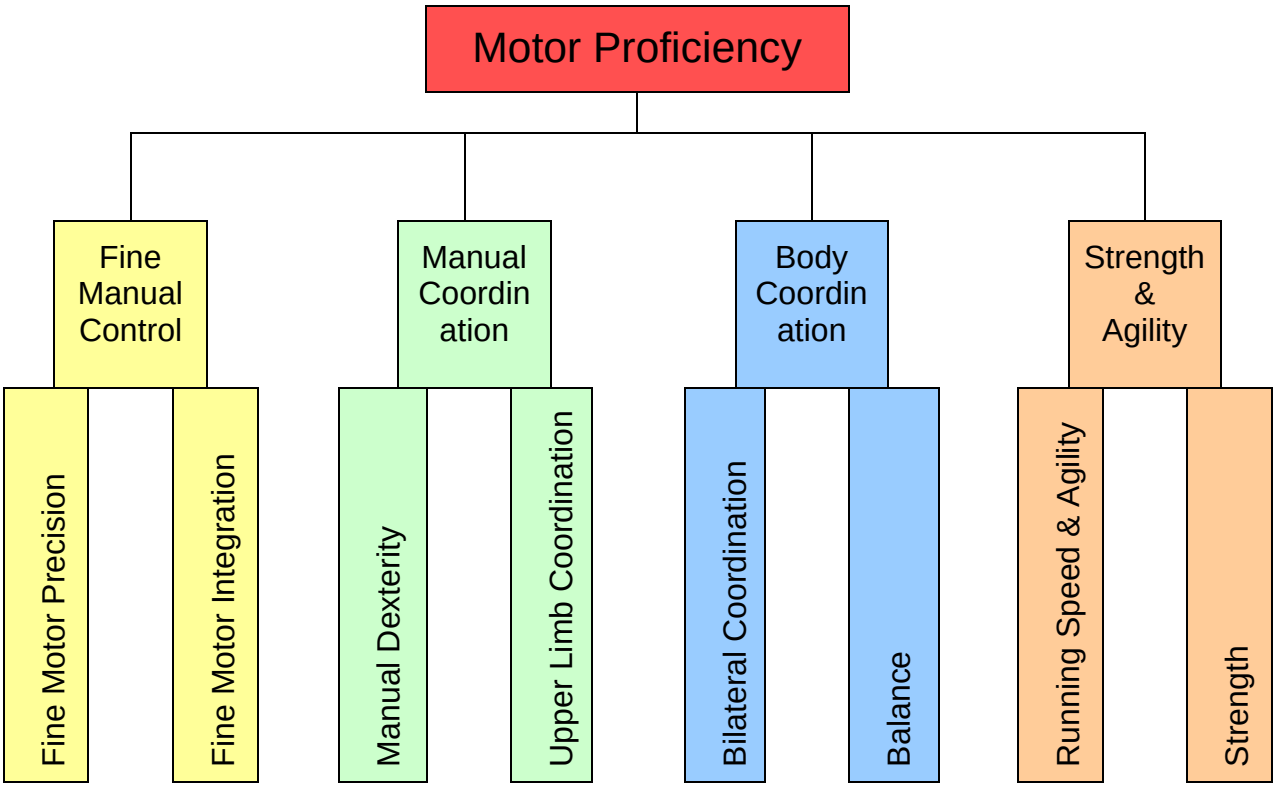

Figure 4

The variables tested by the Bruininks-Oseretsky Short Form

Subtest 1: Fine Motor Precision

a. a. The child has to draw lines through a path. The child holds the pencil in the preferred hand and has to draw a line in the path on paper from the car to the house. The line does not have to be continuously drawn but the child is not allowed to rotate the page at any time to complete the line. Record the number of errors made, error when line leaves the path.

b. Folding paper. An example is shown to a child on paper with dotted lines and the child then has to fold the other corners and then fold the paper in half as indicated.

Subtest 2: Fine Motor Integration

a. Copying a Square: The child has to copy a square on paper. Maximum raw score is 5; the child gets 1 for basic shape, closure, edges, orientation and overall size of the shape copied.

b. Copying Star: The child has to copy a star on paper with maximum score of 5, receives 1 for basic shape, closure, edges, orientation, and overall size.

Subtest 3: Manual Dexterity

Transferring pennies: The child has to place 20 pennies into a penny box in 15 seconds. The pennies are placed on the side of the preferred hand the child transfers the penny to the other hand and then places it in the penny box. Pennies may be picked up in any order. After 15 seconds the time is stopped and record the number of pennies put into the box in 15 seconds.

Subtest 4: Bilateral Coordination

a. Jumping in Place- Same sides Synchronized: The child stands with preferred arm and leg on the same side forward and the other leg and arm to the back. The child jumps up bringing non-preferred leg and arm on the same side forward and moving other leg and arm to the back. Child continues to jump reversing leg and arms. Jumps must be performed continuous. Second trial only conducted when the child does not get a raw score of 5 on the first attempt.

b. Tapping Feet and Fingers- Same side Synchronized. The child sits at a table with index finger extended and other fingers tucked in. The child then simultaneously taps foot and index finger on the same side of the body. Then, simultaneously on the other side of the body. Continues tapping, alternating same-side taps, with continuous taps. Second trial only conducted if the child does not score 10 correct taps on the first trial.

Subtest 5: Balance

a. Walking forward on a line: Child stands on line with preferred foot parallel to the line and hands on hips. The child walks forward in a natural stride, placing feet on and parallel to the line with each step. Maximum raw score is 6 steps. Second trial only if raw score is not earned in first attempt.

b. Standing on one leg on balance beam eyes open: The child stands on the balance beam with preferred foot. Hands are on hips, raising non-preferred leg behind him, knee bent at 90 degrees and shin parallel to floor, looking forward at the target. A maximum of 10 seconds must be earned on the beam.

Subtest 6: Running Speed and Agility

One-Leg Stationary Hop for 15 seconds. Child starts with feet together, placing hands on hips. The non-preferred leg is raised, knee bent 90 degrees and shin parallel to floor. The child hops up and down on preferred leg maintaining proper form with each hop. A second trial is only conducted if the child stumbles or falls with the first attempt.

Subtest 7: Upper-Limb Coordination

a. Dropping and Catching a Ball- Both Hands. The child holds the tennis ball in both hands and extends both arms in front of his or her body. The child drops the ball and after it bounces on the floor, catches the ball with both hands. The child may bend over or move to catch the ball. Record the number of correct catches up to five.

b. Dribbling a Ball- Alternating Hands: The child holds the tennis ball in preferred hand and extends preferred arm in front of his or her body. The child drops the ball and then alternates with each dribble, moving if necessary to continue dribbling. Second trial only if a maximum raw score of 10 dribbles is not conducted on the first trial.

Subtest 8: Strength

a. Knee Push-up or Full Push-up: The child does the maximum amount of push-ups possible in 30 seconds.

b. Sit-ups: The child does the maximum amount of sit-ups possible in 30 seconds.

Attention Deficit/Hyperactivity Test

The Attention-Deficit/Hyperactivity Disorder Test (ADHDT) is a norm-referenced behavioural checklist that is used to help identify persons ages three to 23 with Attention-Deficit Hyperactivity Disorder (Gilliam, 1995). Based on the DSM-IV (American Psychiatric Association, 1994) definition of ADHD, the 36 item ADHDT is comprised of three separate subtests that correspond to three core categories of symptoms associated with ADHD: Hyperactivity, impulsivity and inattention (see Figure 5). Criterion validity has been established with the Connor's Teacher's Rating Scales Test (.78 for hyperactivity, .49 for impulsivity, and .88 for inattention) (Gilliam, 1995).

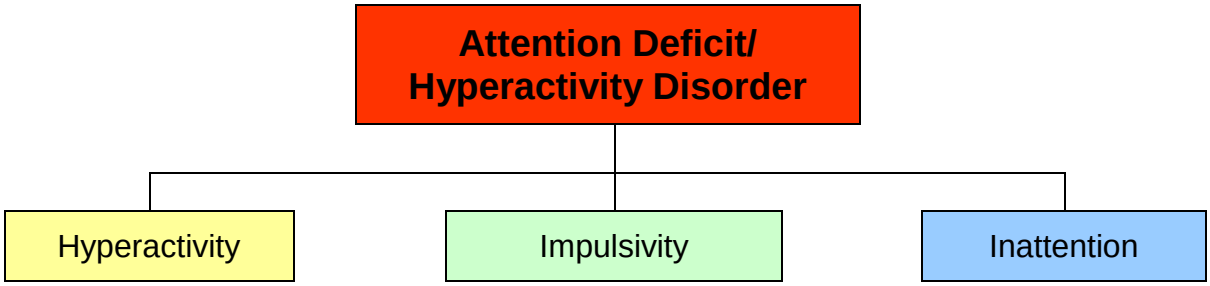

Figure 5

The three core behavioural categories of ADHD

The checklist (see Appendix F) is easily completed in a short period of time by parents, teachers, or others who have had sustained contact with the subject. Scoring is simple. Each item is rated on a scale of 0 to 2 indicating the extent to

which the behaviour described in the item is seen problem for the subject. The following interpretations are provided with the rating scale:

0= Not a Problem.

1= Mild Problem.

2= Severe Problem.

Each subtest consists of a list of behavioural descriptions. Raw scores can be reported on an item by item basis, and a total can be reported either for each subtest or for the total score out of 36 items. According to Gilliam (1995), the ADHDT is a valid and reliable instrument that can be used with confidence to support the diagnosis of ADHD when the raw scores are converted by summing the standard scores for the subtests and converting that value to a quotient that can be interpreted on a normative scale. Raw scores can be used to document progress in the problem areas as a result of an intervention programme.

Lesson Plan

A lesson plan format was developed to keep a record of the content of each lesson in terms of the aspects of attention that were emphasized, the types of sensory-motor activities performed and the predominant teaching strategies used to facilitate the lesson (See Appendix A- E). The lesson plan was considered to be a crucial source of information for planning subsequent lessons as well as for presenting a holistic picture of each child's movement experiences during the programme.

The location of the each lesson was also noted on the plan. Although location was not always in the ideal location the researcher tried her utmost to keep the location for each session as plain and simple as possible eliminating distractions as much as possible. Lesson location played a very important role in challenges to the attentional control of the children. Columns were provided where the researcher jotted down the specific activities for the day regarding the sensory-motor challenges and the focus on attentional development. At the bottom of the lesson plan was an easy tick-box format to make it easier to describe the nature of each lesson more easily and to calculate frequencies of

emphasis on attentional control, sensory-motor system and teaching strategies. A comment box was also available to jot done any specific observations of the day as well as the homework given to each participant. Observational focus was on the effect of the environment and activities on the participant, modifications made and interesting facts about the interaction of the learner during the specific session.

Journal

During the programme the researcher kept a daily journal (lesson-by-lesson), making notes on the goals for each session, the apparent effects of the activities and environment on the participant as well as any modifications and new goals that were made for each session. The journal was divided into five sections, one for each participant. In each section, the completed lesson plans were filed. Here all modifications and observations of the day were recorded. Journal entries were not only focused on the motor performance of each participant, but also on the behavioural signs of ADHD as identified in the ADHDT checklist. Additional observations about how participants reacted to the sessions were noted; including what seemed to aggravate them or motivate them, what upset them or triggered a negative of positive emotion (See Appendix A- E).

Selection of Participants

The participants in this study were a sample of convenience from a group of children, whose parents attended an ADHD support group meeting in May, 2008. All parents in the group had children who attended the ADHD special needs school that was the host for this research project. The researcher was given the opportunity to make a presentation about the nature of this research at the meeting. A letter of information and a consent form was distributed to the parents (See Appendix F). They were asked to reflect on the opportunity for their children to participate and if interested, to speak to their children to decide whether or not they wanted to volunteer for the study. The researcher was available via email and telephonically if parents had any questions or wanted to know anything about the programme.

The researcher spent one day at the school in June, during which time the five children whose parents had returned consent forms were able to talk with the

researcher about the study and could ask questions. Because the children taking part in the study also had volunteer to participate in the programme, the researcher spent time with the children describing the types of tests and activities that would be used during the sessions, before asking them if they wanted to volunteer. All of the children indicated they did want to volunteer and they then signed their name to the consent form as well. The parents were also invited to come to the school on the day of this discussion, to ask any questions and to share their thoughts on any aspect of ADHD, including its affect on their children and their family.

Baseline Data Gathering

The first four weeks of this 12-week research project were set aside as the baseline period. It occurred during the school holidays. Pre-participation information was gathered about the children by the researcher in three ways.

1. The parents and teachers of each child were asked to fill out the ADHDT each week for the four weeks before the programme began. The purpose of this was to create a baseline pattern of behaviour in terms of hyperactivity, impulsivity and inattention for each child.

2. The researcher conducted classroom observations at the school and spoke individually to the teachers of the participants. This was done as an effort to understand each child better and to make the selection of attentional focus, sensory-motor activities and teaching strategies for the initial lessons, more specific to each participant.

3. Baseline testing was mid June to determine the motor proficiency of the individuals using the BOTMP Short Form.

Intervention Programme

The intervention programme began during Week five. Each participant completed the BOTMP Short Form as the pre-test of their motor proficiency. This

was to determine if there were any changes from the baseline BOTMP results in terms of the participants' motor proficiency after the school holiday.

The parents and teachers were asked to continue their weekly completion of the ADHDT. The researcher did not have access to their reports during the intervention programme to avoid being influenced by feedback from parents and teachers. The reports were intended to determine if any pattern as noticed in terms of hyperactivity, impulsivity and inattention during the six weeks of the intervention programme.

The researcher was also the teacher for the perceptual-motor intervention programme. The programme was conducted 30 minutes x 1 per week, for six weeks:

Determination of Movement Content

The movement content for each lesson was drawn from one or more of the six focus areas for sensory-motor development identified by (Cheatum & Hammond, 2000): Body awareness, the proprioceptive system, the vestibular system, the visual system, the auditory system and the tactile system. Decisions about the specific movement activities in each lesson were initially based on the performance of the child in the BOTMP Short Form. The researcher set a basic lesson plan in place for each of the individuals. The broad outline was more or less the same when it came to the attentional skills focus and teaching and behavioural strategies. The rest of the activities and the way in which it took place during each session was based on the individual needs of the individual. The researcher often included activities that would help the participant improve on his/her weaknesses as identified during the pre-test. The observations of the researcher about the movement needs of each child during subsequent lessons also contributed to decisions about movement activities.

Determination of Attentional Focus

Each lesson adopted a particular focus on attentional development as well as sensory-motor development. The selection of these attentional skills was based on the an intervention programme known as "Play Attention" (see Figure 6). The

five attentional skills in the “Play Attention” programme are compatible with five of the six different kinds of tasks that Santostefano (1984) recommended as guide in the design of programmes to help individuals gain control over their selective attention. These skills included the following: learning to control distractibility, learning to focus using visual tracking, developing time-on-task, short-term memory sequencing and discriminating among cues/objects and signals.

Determination of Teaching Strategies

A selection of specific teaching strategies was identified because they had been found to be successful when working with children who show signs of ADHD (Bester, 2006; Munden & Arcelus, 1999; Flick, 1998). They also were recommended by the American Academy of Paediatricians (2001).

- Verbal cues.
- Motivational techniques.
- Visual and auditory cues.
- Demonstrations.
- Mental pre-set.
- Maintain concentrations.
- Attentional switching.
- Organization.
- Frequent/ immediate feedback.
- Individualised activities.

These were also the strategies used by the school where the study took place, so the participants were familiar with them.

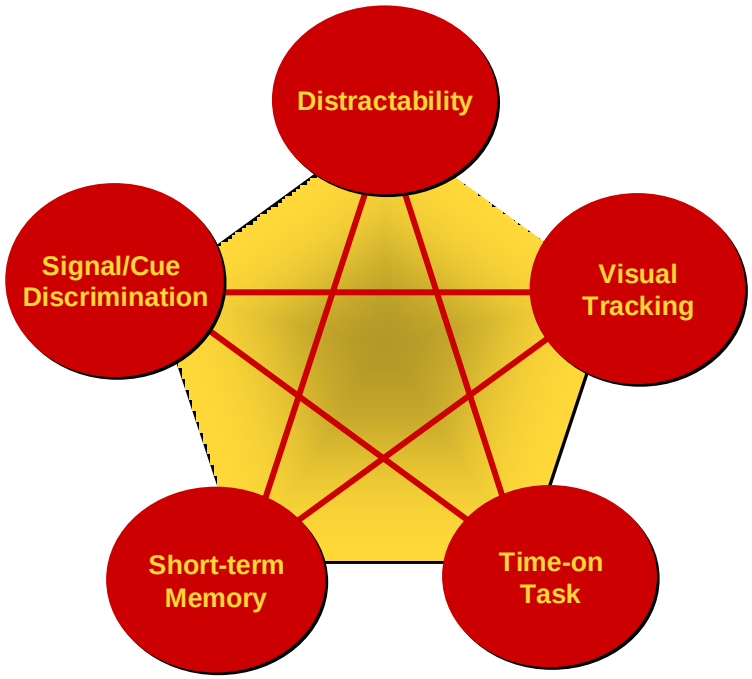

Figure 6

Five focus areas for attentional skill development

Post programme Assessment

A Post-Test of the BOTMP was completed during the tenth week of the programme. Parents and teachers were requested to keep filing their weekly ADHDT forms for the final two weeks of the project.

The researcher also visited the school on a regular basis for one month after the program had ended, randomly talking to some of the teachers and asking how the participants were doing.

Data Analysis

The researcher analysed the effects the programme had on the motor proficiency of each child on a case-by-case basis, using the following sources of information:

1. Motor proficiency, as measure by the baseline, pre-test and post-test of the BOTMP Short Form.

2. Behavioural patterns in terms of hyperactivity, impulsivity and inattention as measured by the 12-week submissions of the ADHDT by the parents and by the teachers. An additional comparison was made of changes in the soft signs of ADHD by comparing the reports of the parents and the teachers during week 1 (first week of the baseline period), week 5 (first week of the intervention programme) and week 12 (the final week of the programme period.

3. Information about the content and teaching strategies used in each lesson, as recorded in the lesson plans.

4. Observations from the journal kept during the sessions to give more insight into the sessions and specific learner.

Ethical Considerations

The Principal of the school and the Ethics Committee of Stellenbosch University approved the presentation of this research project to the parents of prospective participants. Participation in the programme was the choice of the parents and the children.

Summary

This chapter was a presentation of the research methodology and a brief description of the assessment instruments and the intervention programme implemented in this study. Chapter Four through Chapter Eight will each consist of a case study report for each of the children who participated in the “Purposeful

Play” Programme implemented in this research. Each chapter begins with a general description of the child’s behaviour, and then presents the results of the baseline pre-tests as well as parent and teacher observations. The specific intervention programme for the participant is then described, followed by a presentation of the results of post-programme tests and observations.

Chapter Four

Results and Discussion - Case Study One

The children who volunteered to participate in this study attended a school established for children with special educational needs associated with the behavioural signs of ADHD. The names used in reporting the results of this research are not the actual names of the participants. Information about the lessons presented is included in separate Appendices for each child.

Nadia

Nadia was a seven-year-old Grade 1 learner born in April, 2001. She was a medium build girl with very long hair. Her movement patterns tended to be stiff and tentative. Her long hair was often a problem for her, especially during warm weather because she was easily irritated by heat and constantly tried to keep her hair out of her face and off her neck. Warm clothing also tended to be a problem since she was easily irritated by perspiration and tried to wipe the moisture away as soon as it appeared. Her thick long hair also contributed to this irritation because she usually started to perspire first on her face and neck.

Nadia seemed very nervous and insecure in new environments. She would try to attend to everything, and then struggle to attend to those aspects of a situation that really needed attention. Her attentional focus ranged from her hair and any of her clothing that might be hanging out of place, to any changes in the environment (*e.g.* a pot plant that had been moved or a wall that had recently been painted in a new colour). She was easily excited and easily became upset. When she really struggled with something or concentrated very hard, she tended to grind her teeth.

Baseline Assessment

Baseline assessment was completed during the four weeks prior to the beginning of the six-week intervention programme.

Observation

There were 12 children in Nadia's class, which was a combination of Grade 1 and Grade 2 learners. The teacher was supported by an assistant teacher who worked with those learners who needed extra help. On the day of the observation in the classroom, Nadia seemed to be a loner, not only in class but also at break-time. During class time, her teacher had to constantly remind her to attend to the tasks at hand and to complete the task. Nadia showed a very high energy level but seemed to be unable to put this energy consistently to good use. That energy was evident in her "restless legs." She found it difficult to stay in her seat and attend to her assigned work. She was very dependent on the teacher for feedback and affirmation that she was doing things correctly every step of the way. The teacher encouraged her to first finish the task and then ask for feedback, rather than getting up the whole time and moving around in the classroom seeking support from either the teacher or the assistant teacher.

Nadia rarely interacted with the other learners in her class. She seemed to play and wander alone at break and playtime. She tended to "hang around" the teacher and used every possible opportunity to seek affection from adults in the form of hugs or little compliments or positive comments. The teacher encouraged Nadia to interact with her classmates and to play on the jungle gym and swings. However, she usually removed herself from the group, swinging alone or sitting to eat her lunch alone.

Nadia's Motor Proficiency

Baseline testing on the BOTMP Short Form was completed four weeks prior to the beginning of the intervention programme. Nadia scored 32 out of a possible 85 on the test. Her scores were particularly weak on the variables of:

Fine motor coordination.

Manual dexterity.

Balance.

Upper-limb coordination.

Nadia's ADHDT Results

Nadia's mother reported that Nadia had many of the behavioural characteristics listed on the ADHDT (See Table 2). At home and in environments other than school, Nadia's mother noted that Nadia showed mild problems in the ADHDT category of hyperactivity with behaviours like being loud, twisting and wiggling when seated, being easily excited, constantly manipulating objects, fidgeting, squirming and generally being restless. She also noted that Nadia tended to grab objects, to talk excessively and to have difficulty remaining seated.

Table 2

Soft signs of ADHD reported by Nadia's parent

Category on ADHDT	Soft Signs Displayed by Nadia
Hyperactivity	Loud Twists and Wiggles Easily excited Grabs objects Excessive talking Difficulty remaining seated Constantly manipulating objects Fidgets Restless Squirms
Impulsivity	Acts before thinking Fails to wait one's turn Difficulty waiting one's turn Blurts out answers Impulsive Interrupts conversations Intrudes on others Does not wait for directions Fails to follow rules of games
Inattentiveness	Poor concentration Fails to finish projects Disorganised Poor planning ability Absentminded Inattentive Difficulty following directions Short attention span Easily distracted Difficulty sustaining attention Difficulty staying on task Difficulty completing tasks Frequently loses things

Nadia's teacher also reported on the ADHDT that Nadia showed many of the soft signs of ADHD (See Table 3). She reported that Nadia struggled to stay seated in class and was constantly twisting and wiggling in her chair. Nadia was also constantly manipulating objects, fidgeting and was very restless with excessive talking, which are all signs of hyperactivity on the ADHDT continuum. The teacher found that Nadia tended to act before thinking and would blurt out answers, interrupting conversations and intruding on others, all of which are evidence of her impulsivity. Nadia showed signs of inattentiveness and had very poor concentration abilities, often failing to finish projects. The teacher found Nadia to be inattentive, disorganised, having poor planning abilities and a short attention span. She was described as absentminded and frequently lost things. She also had difficulty following directions, staying on task, sustaining attention and completing tasks.

Table 3

Soft signs of ADHD reported by Nadia's teacher

Category on ADHDT	Soft Signs Displayed by Nadia
Hyperactivity	Constantly twisting and wiggling in her seat Manipulating objects Fidgets Very restless Excessive talking
Impulsivity	Acts before thinking Blurts out answers Interrupting conversation Intruding on others
Inattentiveness	Poor concentration abilities Fails to finish projects Inattentive Disorganised Poor planning abilities Short attention span Absentminded Frequently losing things Difficulty following directions Difficulty staying on task Difficulty sustaining attention Difficulty completing tasks

Intervention Programme

BOTMP Pre-Test

On the day of the BOTMP pre-test during the first week of the intervention programme, Nadia was very distracted. She had a tendency to see the environment around her in great detail and could not seem to disregard things that were unimportant to the task at hand. When she entered the testing environment she noticed changes that had been made to the environment since she last entered it. She pointed out each and every change that had been made and identified the new objects that had been added to that environment. For example, she was distracted by the pot plant and carpet that had been added to the testing area since she was there last. She kept on tidying the carpet, straightening out the tassels on the carpet's edge and pulling out creases whenever the carpet moved. She was talking continuously during the pre-test, enquiring about each task. It took longer to complete the BOTMP than it did for baseline assessment because Nadia needed frequent help to re-focus on the test items.

The results of this pre-test administration of the BOTMP found that Nadia's scores were low on the following variables:

Manual dexterity (also identified during baseline testing).

Bilateral coordination (not identified during baseline testing).

Balance (also identified during baseline testing).

Agility (not identified during baseline testing).

Upper-limb coordination (also identified during baseline testing).

Strength (not identified during baseline testing).

The low score on fine motor coordination identified during the baseline tests did not recur on the pre-test.

Nadia found the use of both the upper and lower extremities in completing a task to be very challenging. When working at her own pace she managed to

complete some of these more challenging tasks, but as soon as speed or distance was introduced to the test, her skills tended to “fall apart.” Nadia’s overall score on the BOTMP was 36 out of a possible 85. Her baseline score had been 32 out of a possible 85.

Purposeful Play Sessions

The Intervention programme for Nadia began the first week in August and was conducted every Tuesday for six weeks. Her 30-minute session usually began at eleven o’clock. A review of the lesson plans for Nadia documented the overall programme focus in terms of the emphasis on sensory-motor content as well as the development of her attentional skills (see Figure 7).

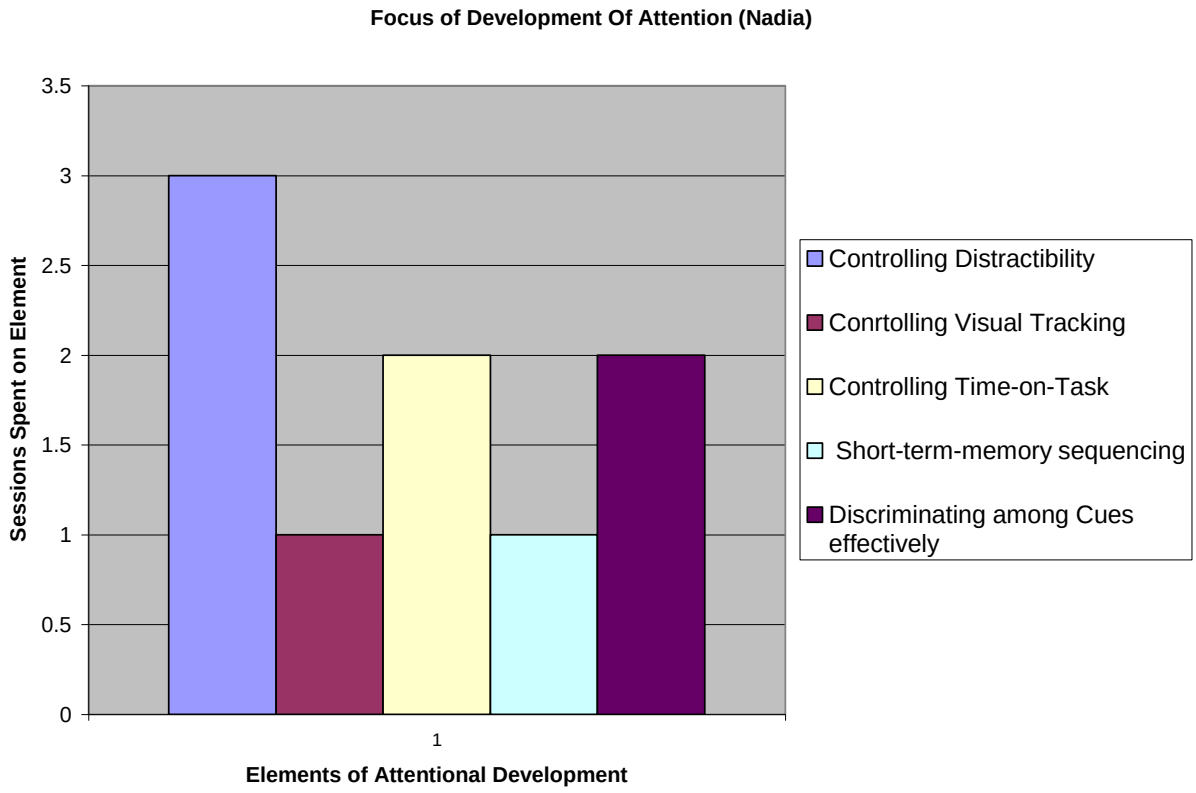

Figure 7

Focus for the development of Nadia’s attentional skills

Lessons in which the content was focused on the development of body awareness, proprioceptive sensitivity and visual skills were the most frequently presented. “Controlling distractibility” was the most common recurring attentional

skills focus, followed by “controlling time-on-task” and “discriminating among cues.”

The predominant teaching strategies used during the six lessons were verbal cues, immediate feedback and demonstrations (see Figure 9). The most common behavioural management technique used was motivation/encouragement, which was used frequently in all six lessons (see Figure 9).

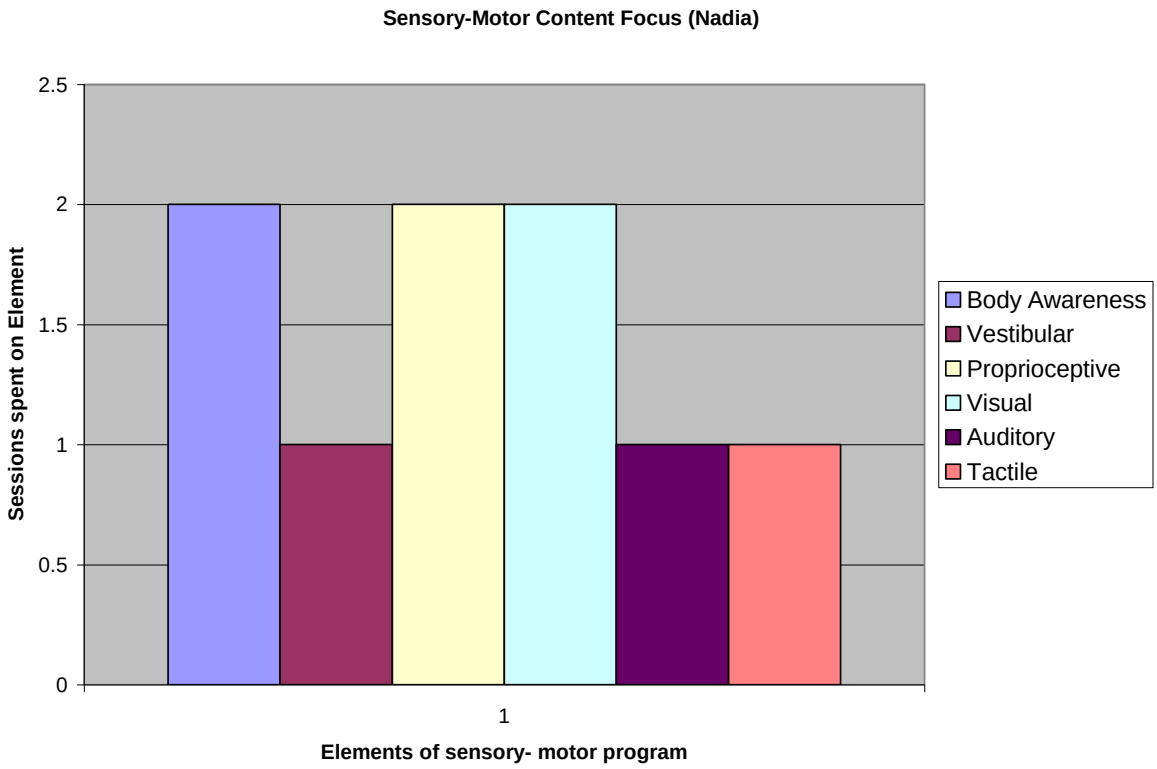

Figure 8

Focus for the development of Nadia's sensory-motor systems

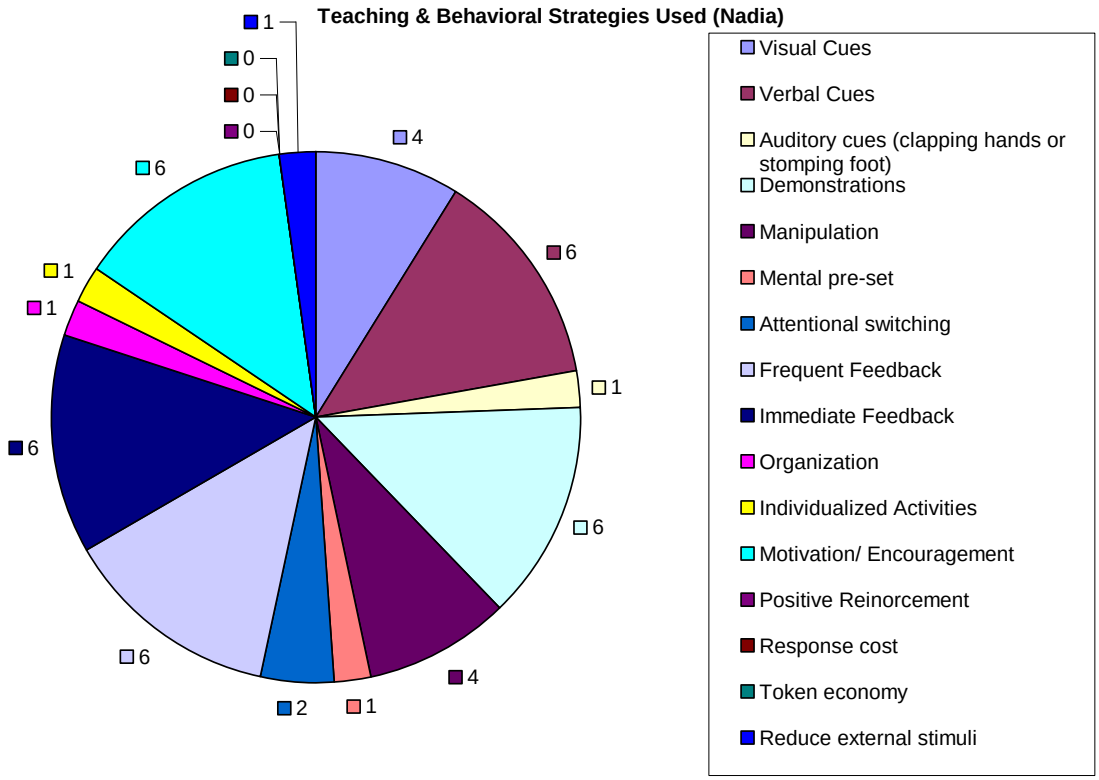

Figure 9

Predominant teaching strategies used during Nadia's sessions

Session One

During the first session, the focus was on developing the proprioceptive and the vestibular systems. The exercises on the floor and on the Swiss ball were focused on coordination and strengthening the core muscles needed for postural control. Nadia was extremely weak in her core and struggled to keep her extremities still during proprioceptive and vestibular challenging activities. Her weak core stability may contribute to her difficulties staying in her seat in the class environment. Her constant shifting in her seat may be efforts on her part to create stimulation of her vestibular system. As mentioned by Solan *et al*. (2007) problems with vestibular function can be associated with deficits in object recognition, spatial navigation, learning and memory. The increased body sway and postural lean that are characteristic of vestibular disorders can become a physical distraction that can increase challenges to the control of attention. Nadia demonstrated a good sense of body awareness but her lack of core stability influenced the effectiveness of all her movements. Her difficulty in keeping focused and staying on task caused her to make unnecessary mistakes in completing body awareness tasks. Instructions had to be repeated a few times during the execution of the task at hand to keep her on track and cues had to be repeated to remind her to finish the task at hand.

Homework after Session One: After the first session Nadia was asked to practice the “bridge” formation on the floor at home, a core stabilisation exercise. She also was asked to practice jumping from tile to tile (in blocks) at home, first double foot and then one-legged jumps (hops).

Session Two

The focus of the second session was on visual tracking and coordination. The session was conducted outside, and it was soon apparent that Nadia was very sensitive to fluctuations in temperatures. She was quickly irritated by the hot weather and humidity outside. She was also very aware of other people and ongoing activities in the background although she could only hear them rather than see them. Nadia had sufficient hand-eye and hand-foot coordination to be reasonably skilled when manipulating big objects. However, when the object sise was decreased, she found it very difficult to be successful. She could manipulate

basketballs, netballs and a mini-soccer ball, but as soon as the ball was the size of a tennis ball or smaller, she struggled.

Because Nadia attended to almost everything around her, she found it very difficult to keep her attention on her performance, which greatly hindered her success. Not all of the activities planned for her were completed because her distractibility meant it took a longer than the anticipated amount of time for her to complete each task. Nadia performed many unnecessary movements, wiggling and squirming during the session. Instructions and cues had to be repeated frequently or she would fail to keep on track and start “doing her own thing.” Nadia did report she had done the previous weeks’ homework and she did show improved balance during hopping.

Homework after Session Two: At the end of this second session she was told to practice her modified juggling skills at home with two rolled-up socks as little balls. She was also asked to practice her one-handed throwing against a wall, with a friend or with a family member.

Session Three

The third session focused on body awareness and memory sequencing. Nadia showed good body awareness capabilities but tended to struggle with memory sequencing. When listening to directions and instructions she could remember the first and last part of the instructions but could not remember the middle part of the instructions every time. The more time spent on providing visual cues, the more capable she was at remembering the middle section of a movement activity.

Several of the body awareness and memory sequencing activities presented at the end of the lesson were conducted while standing on a Bosu ball. While Nadia had been able to successfully perform these activities when standing on the ground, she struggled when the instability of the ball was introduced. The greater stimulation of the proprioceptive and vestibular systems may have distracted her to the extent that she could not complete the tasks. Some of the most valuable teaching strategies used during this session were verbal cueing, frequent feedback and repetition. Encouragement was effective as a behavioural management technique.

Homework after Session Three: At the end of this session Nadia revealed that she did not do the previous weeks' homework every day. During the session she did say that her family had played memory games at home during the week and the researcher encouraged her to do that as often as possible until the next session.

Session Four

The fourth session was focused on "time-on-task" activities and taking time to establish a mental set. The teaching strategy of verbal cueing was effective during auditory development activities. For each activity, Nadia was asked to listen and then repeat the instructions, trying her best to tell the researcher how each task should be performed. By adopting a calm mental set and then engaging in step-by-step rehearsal, Nadia achieved a good success rate in the tasks. When she repeated orally what she was supposed to do (self-talk), she seemed more resistant to distractions presented by external stimuli.

Encouraging Nadia to listen to her own voice and to give herself "instructions" during an activity was definitely helpful. But Nadia continued to focus too much on irrelevant details which led to a very slow pace of doing things. She needed constant reminders of what was important. The most effective teaching strategy used in this session was frequent feedback.

Homework after Session Four: No "homework" was given for the next few sessions because Nadia's parents were overseas for two weeks and the children were staying with their grandparents.

Session Five

The fifth session was the week focused on the visual system. Aiming activities were provided that used various colours, shapes and sizes of objects. The shapes and sizes of the targets varied from a target hoop on the wall to a bucket or hoop on the floor, as well as cones and beacons. Throwing equipment varied from beanbags to tennis balls, different colour softballs and handballs. Target games where the main form of activity used to challenge Nadia's ability to control distractibility and focus on what is important among different cues.

Nadia did not seem to enjoy the session. Her classroom teacher informed the researcher that she was struggling to keep Nadia task-orientated in class. It was then learned from Nadia's mother that her paediatrician was re-evaluating the effectiveness of Nadia's medication. Nadia's movement patterns deteriorated and she was very distracted. She had very rigid body movements and tended to show signs of even more immature movement patterns than usual. She struggled doing activities and became tired easily. She was distracted by both external and internal stimuli. Environmental stimuli that were causing problems were things like dust, leaves, wind, sand on the beanbags and the weight of the different beanbags. In terms of internal stimuli, Nadia kept pulling on her clothes, her hair and her skin. It seemed that she was irritated by everything. Nadia became upset and emotional as soon as things did not go her way. She over-corrected each mistake. Teaching strategies employed during the session were demonstration, refocusing and verbal cueing. Motivational comments were frequently made to try to create a positive climate. No homework assignment was given.

Session Six

During the sixth session it was impossible to keep Nadia's attention for more than 30 seconds at a time. After the performance of one trial of a task, every instruction had to be repeated again. It was as if each time she received an instruction, she was hearing it for the first time. She could not transfer the use of cues from one task to a similar task. All of her movement patterns, even her walking, were immature and rigid.

The classroom teacher confirmed that Nadia showed all of these symptoms in class as well. She noted that Nadia's movements had become very rigid and immature and her fine-motor skills had deteriorated immensely. The teacher said she struggled keeping Nadia focused in class for more than three minutes at a time. None of the teaching and behavioural strategies were successful in helping Nadia to focus her attention on any task.

Post-programme Assessment

The BOTMP was administered immediately after the conclusion of the intervention programme (the 10th week of the study). The parents and the teacher were asked to continue to complete the ADHDT for weeks 11 and 12 in order to determine if the programme had any impact on Nadia's behaviour. Changes in motor proficiency were tracked by comparing the baseline results with the pre-test and post-test results. Changes in ADHD were tracked first by drawing a polygon of the changes in hyperactivity, impulsivity and inattention. Then, comparison of changes in the soft signs in each category were tracked by comparing week one reports (baseline) with week 5 (pre-test) and week 12 (post-test) results.

Changes in Nadia's Motor Proficiency

During the BOTMP post-test Nadia was still showing some signs of rigid and immature movements. However, she showed substantial signs of improvement on variables of bilateral coordination, balance, agility and upper-limb coordination. Nadia's total score for motor proficiency improved from 32 baseline and 36 pre-test to a score of 52 out of a possible 85 on the post-test (see Figure 10). Nadia's results for the baseline, pre- and post-test on the BOTMP Short form were made up out of 8 variables (See Figure 11).

Fine Motor Precision

On the baseline test Nadia faired well on the drawing lines through paths tasks, but faired very badly on the folding paper task. During pre-test she did not only struggle with the task on folding paper but her ability to draw lines through paths also deteriorated. These results stayed the same for the remainder of the programme and her results were the same on these elements on the day of post-testing. These results in accuracy of fine motor precision may be linked to her ability to stay focused at the end of the programme because her ability to pay attention was negatively affected at the end of the programme by her medical situation regarding the reassessment of her medication.

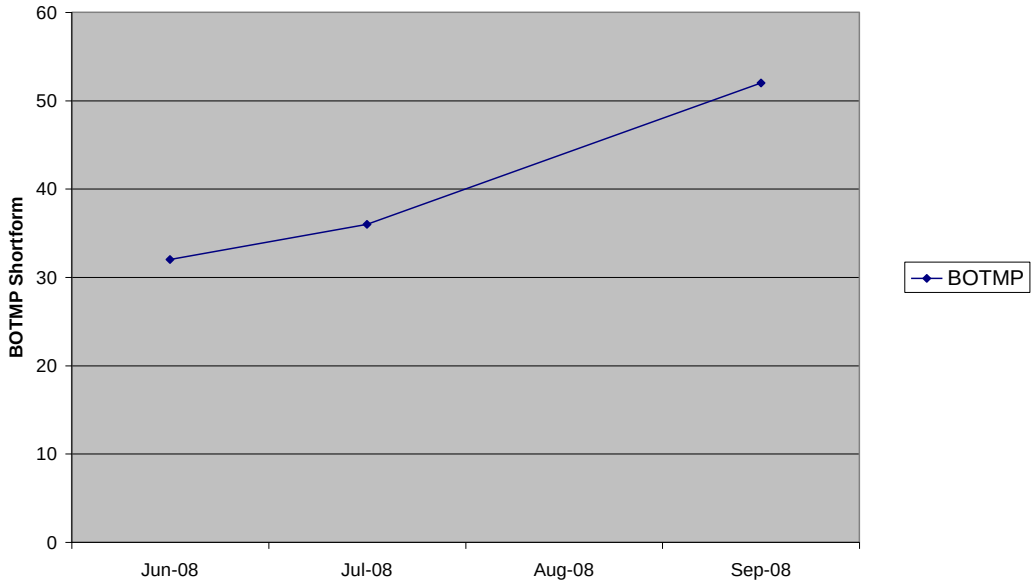

Figure 10

Changes in BOTMP results for Nadia

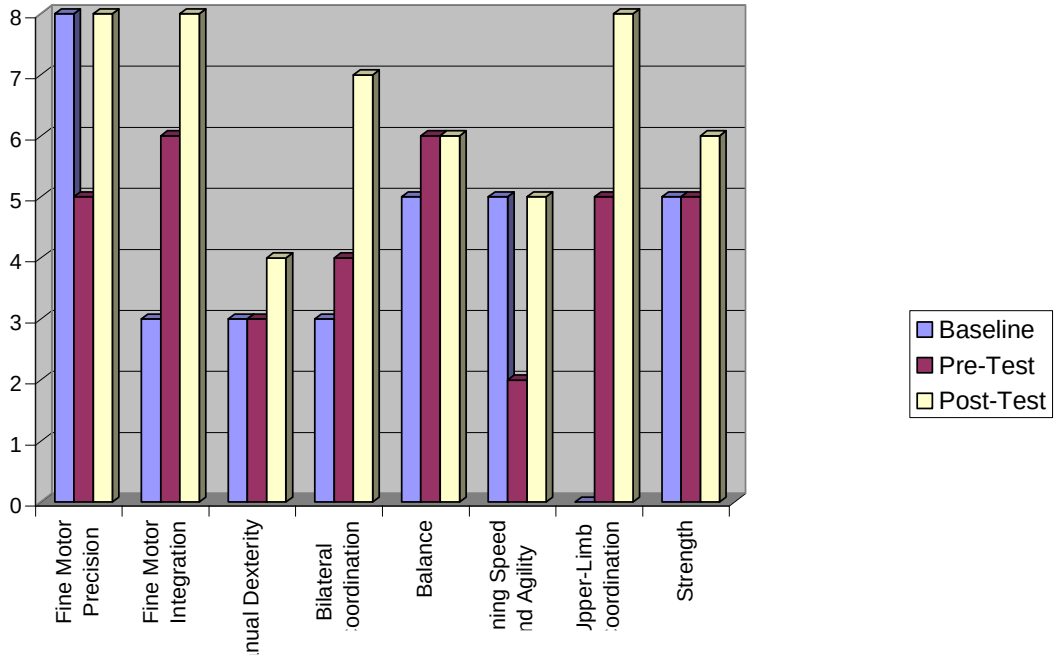

Figure 11

Changes in BOTMP according to each of 8 variables

Fine Motor Integration

Nadine struggled copying the star on the baseline test but was able to score some of the points on copying the square. During pre-testing her ability to copy the star improved and she was able to score 3 of the 5 points on the copying task of each shape. During post-testing Nadia was able to copy the square with great success but still could not achieve all the points on the star copying task.

Manual Dexterity

On the baseline test Nadia was only able to transfer between 7 and 8 pennies during the 15 seconds and scored 3 points on the test. During pre-testing she also scored 3 points on the task and on the post-test she was able to score 4 points by transferring between 9 and 10 pennies during the 15 seconds of the task.

Bilateral Coordination

On the baseline test Nadia was only able to score 1 points on jumping with same sides synchronised, this means that she was only able to have one successful jump out of a possible 5 attempts; and 2 points on the tapping fingers, which means that she was only able to have between 2 and 4 successful taps out of a possible 10 attempts. During pre-testing Nadia was unable to jump with same side synchronised and score no points, she did however score 10 points on the tapping task as she was able to perform 10 synchronised taps, during post-testing she did improve on the jumping task and not only scored a maximum on the tapping score but also on the jumping task. She scored 3 points on the jumping task which means she was able to perform 5 synchronised jumps and 5 points on the tapping task as she was able to perform 10 synchronised taps during the task.

Balance

During baseline, pre- and post-testing Nadia was able to score the maximum amount of points on the task testing her ability to walk forward on a line. She however showed huge difficulty with her ability to balance on one leg on a balance beam for 10 seconds with her eyes open. During baseline testing she was only able to balance for between 1.0 and 2.9 seconds on the beam, scoring 1 point on the task. During pre-testing she did show improvement and was able to

balance for between 3.0 and 5.9 seconds, scoring 2 points on the task. On the post-test she did show some improvement on her ability to balance but still was only able to score 2 points on the task.

Running Speed and Agility

During baseline testing Nadia was only able to do between 15 and 19 hops, earning herself 5 points of the task. During pre-testing she was only able to do between 3 and 5 successful hops, earning herself only 2 points on the test, during post-testing she improved from the pre-test and was again able to do between 15 and 19 hops as on baseline testing, scoring 5 points on the task.

Upper-Limb Coordination

During baseline testing Nadia was unable to perform either of the tasks correctly and did not score any points. During pre-testing she was able to perform two drop and catch actions and three dribbling actions, earning 2 and 3 points respectively. On the post-test she was able to drop and catch the ball successfully, scoring the maximum of 5 points. On the dribbling task she was only able to perform 3 successful dribbles and earned herself 3 points on the task.

Strength

During baseline testing Nadia could only perform between 3-5 push-ups in 30 seconds and between 6-10 sit-ups in 30 seconds. During pre-testing her push-ups improved slightly and she scored 3 points on the task (6 -10 push-ups). She was only able to do between 3 and 5 sit-ups and scored only 2 points on the task. During post-testing her push-up score was the same as baseline testing, but she was able to improve her sit-up score, earning 4 points on the task (11-15 sit-ups).

Changes in Nadia's ADHDT Results

Changes in ADHDT results submitted by the parent showed a reduction in the severity of the soft signs (see Figure 12) that was not matched by the reports submitted by the teacher over the same 12-week period (see Figure 13).

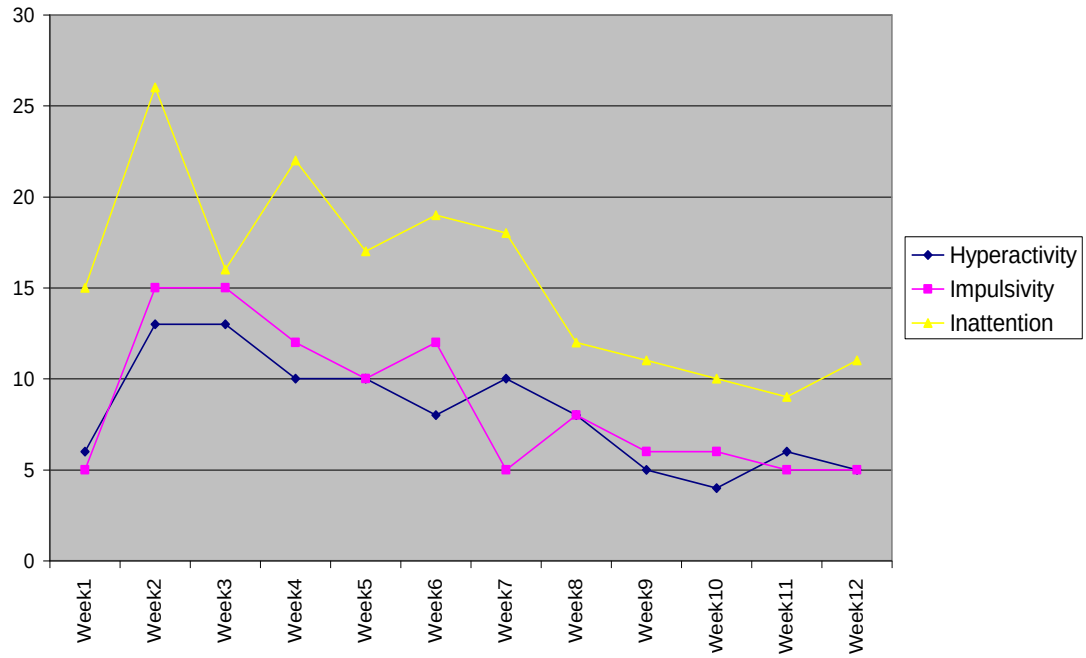

Figure 12

ADHDT results submitted by Nadia's parent over 12 weeks

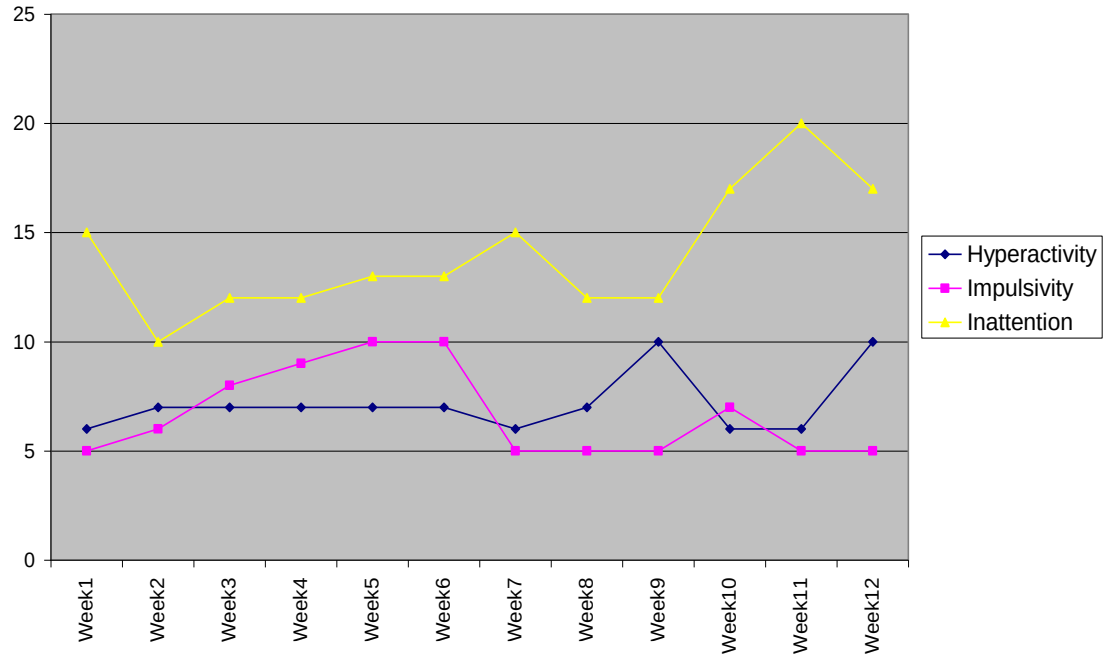

Figure 13

ADHDT results submitted by Nadia's teacher over 12 weeks

Differences in Perceptions of Nadia's Hyperactivity

Differences between Nadia's parent's report and her teacher's report in relation to the sub-scale for hyperactivity are evident when Figure 14 is compared to Figure 15.

Nadia's mother reported several changes on the soft signs of hyperactivity during the duration of the programme. During the initial testing she indicated that Nadia had severe problems with being loud, twisting and wiggling in her seat, grabbing objects and excessive talking. Her mother reported mild problems with Nadia constantly manipulating objects, fidgeting, being restless and squirming and being easily excited. During pre- and post-testing she indicted that the problems with being loud, twisting and wiggling in her seat, grabbing objects and excessive talking, where not as severe but still were mild problems. During pre-testing her mother noted mild problems with Nadia being constantly on the go, but by the end of the programme this did not appear to be a problem any more. Problems with Nadia constantly manipulating objects, fidgeting and squirming, improved by the time of pre-testing and were not considered to be a problem by the end of the programme. Nadia did however continue to have problems with being restless during the duration of the programme.

Nadia's teacher reported several changes on the soft signs of hyperactivity during the duration of the programme. During the initial testing she indicated that Nadia had mild problems with twisting and wiggling in her seat, remaining seated, excessive talking, constantly manipulating objects, as well as fidgeting and restlessness. By the post-testing she indicated that Nadia had shown no improvement in any of the soft signs on the ADHDT. According to the teacher Nadia showed deteriorations in her ability to play quietly, she was easily excited and tended to grab objects and also squirmed in class.

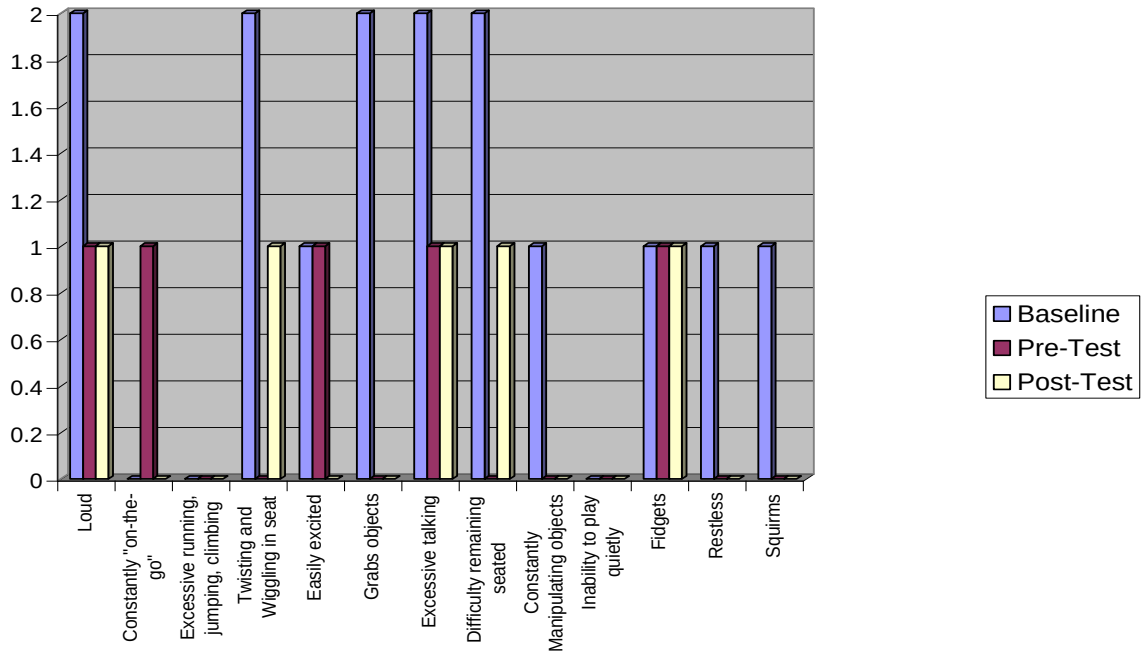

Figure 14

Soft signs of hyperactivity reported by Nadia's parent

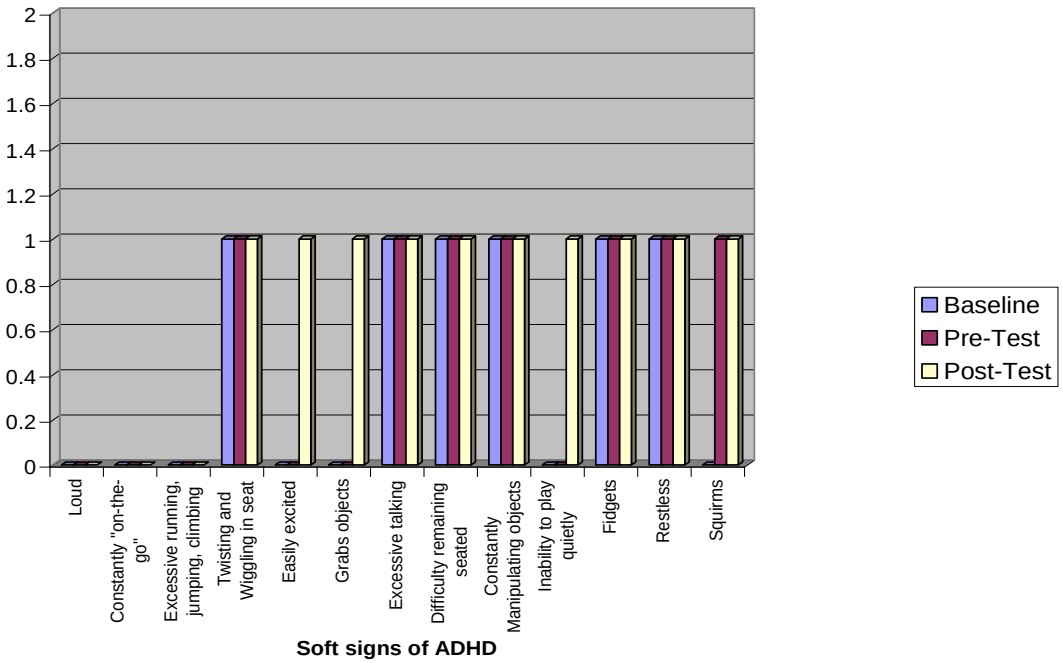

Figure 15

Soft signs of hyperactivity reported by Nadia's teacher

Baseline, pre- and post-testing ratings were in agreement between Nadia's mother and teacher on soft signs like twisting and wiggling, being easily excited and grabbing objects, talking excessively, remaining seated, constant manipulation of objects and fidgeting, restlessness and squirming. These behaviours were all reported by both Nadia's parent and her teacher during initial testing. The soft signs of fidgeting, difficulty remaining seated and twisting and wiggling in her seat remained a mild problem.

Differences in Perceptions of Nadia's Impulsivity

Differences between the parent's and teacher's report in relation to each items on the ADHT sub-scale for impulsivity are evident when Figure 16 is compared to Figure 17.

Nadia's mother reported several changes on the soft signs of impulsivity during the duration of the programme. During the initial testing she indicated that Nadia had severe problems with acting before thinking, failing to take turns and failing to wait turns. Nadia also had problems with impulsiveness, blurting out answers, interrupting conversations, intruding on others and failing to wait for directions, and following the rules of games. During pre-testing her mother indicated that these soft signs where not as severe and found that Nadia was only having mild problems with these behaviours. By the end of the programme she indicated that there were no more problems with failing to take turns/wait turns, impulsivity and the ability to follow the rules of games.

During post-testing Nadia's mother indicted that behaviours such as acting before thinking, blurting out answers, intruding on others and interrupting others and the inability to wait for directions, where not as severe but still led to mild problems. Nadia did not show any major deterioration during post-testing according to her mother.

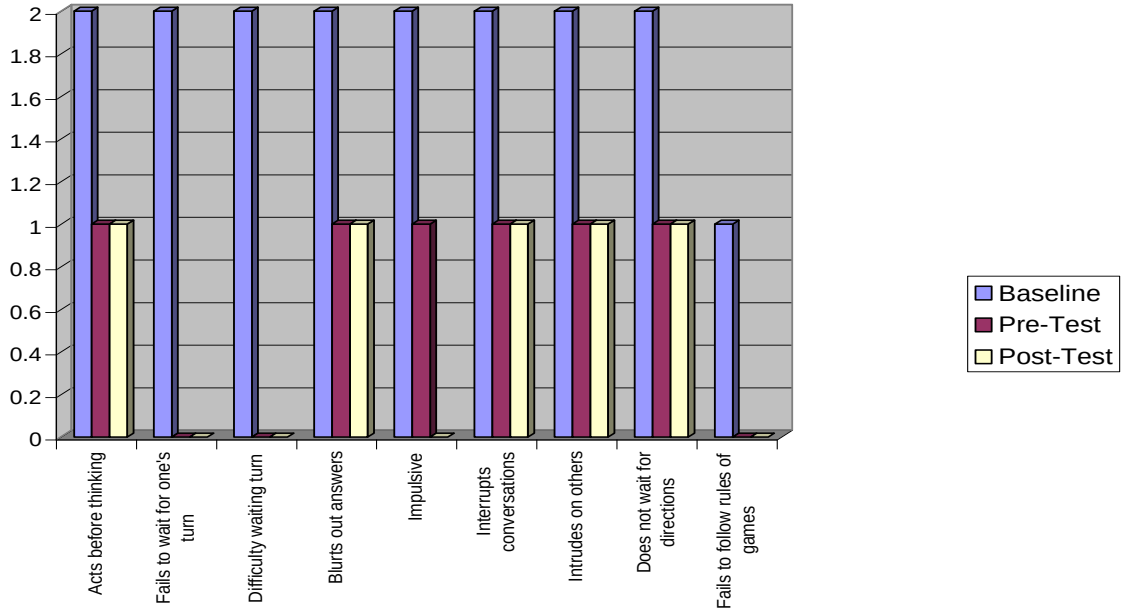

Figure 16

Soft signs of impulsivity reported by Nadia's parent

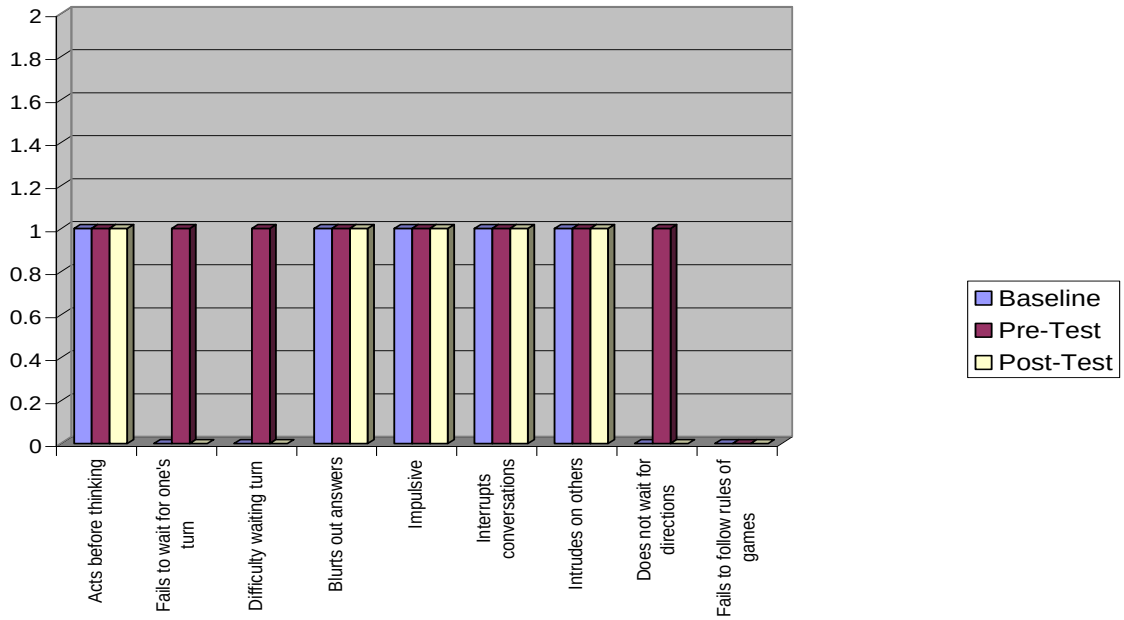

Figure 17

Soft signs of impulsivity reported by Nadia's teacher

Nadia's teacher reported several changes on the soft signs of impulsivity during the duration of the programme. During the initial testing she indicated that Nadia had mild problems with impulsivity, acting before thinking, blurting out answers, interrupting conversations and intruding on others. By the time post-testing she indicated that Nadia had only shown improvement in her ability to not intrude on others and follow the rules of games, but no improvement in any of the other soft signs.

According to the pre-test report of the teacher, Nadia showed deteriorations in her ability to wait her turn and take turns during pre-testing but indicated that these behaviours had improved by the time of post-testing.

Baseline, pre- and post-testing ratings were in agreement between Nadia's mother and teacher on all soft signs of impulsivity. They differed only in terms of the severity with which they rated the problems. Both agreed that Nadia's ability to take turns and wait for her turns as well as her ability to follow the rules of games did not show any problems at the end of the programme.

Differences in the Perceptions of Nadia's Inattention

Differences between the parent's and teacher's report in relation to each items on the ADHT sub-scale for inattention are evident when Figure 18 is compared to Figure 19.

Nadia's mother reported several changes on the soft signs of inattention during the duration of the programme. During the initial testing she indicated that Nadia had severe problems with poor concentration, failing to finish projects, being disorganised, poor planning ability, absentmindedness and inattention. Nadia also had severe problems following directions, a short attention span, was easily distracted and had difficulty sustaining attention. She also indicated that Nadia had severe problems frequently losing things, difficulty sustaining attention on-task and completing tasks. On the pre- and post-test assessment, she indicted that the following behaviours were not as severe, but still were associated with mild problems: poor concentration, failing to finish projects, disorganisation, poor planning, absentmindedness, inattention, following directions, attention span, distractibility, sustaining attention, losing things, staying on-task and completing tasks.

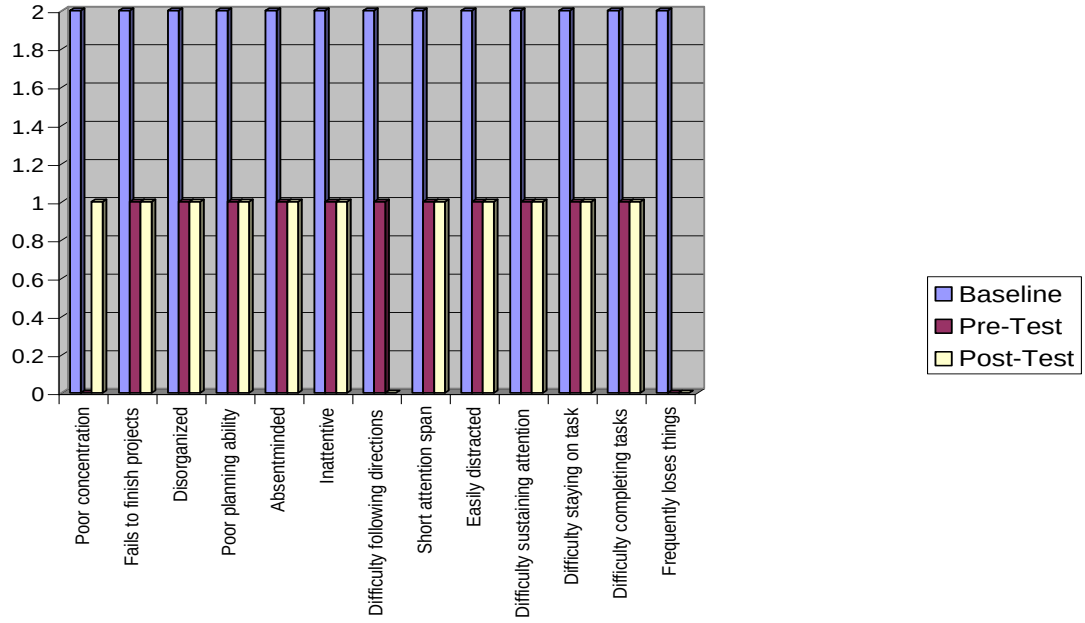

Figure 18

Soft signs of inattention reported by Nadia's parent

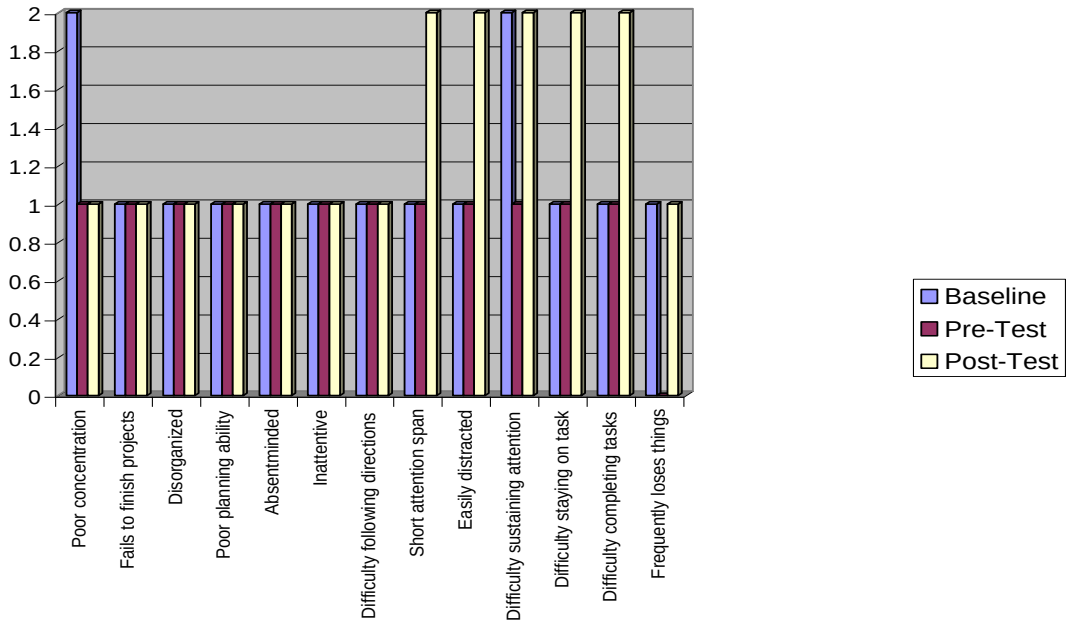

Figure 19

Soft signs of inattention reported by Nadia's teacher

By the end of the 12-week period, Nadia's parent reported no more problems with Nadia's ability to following directions she was not losing things frequently. However, Nadia did still show problems with the rest of the soft signs of inattention, but they were only rated as mild problems. Nadia did not show any major deterioration during post-testing, according to her mother.

Nadia's teacher reported several changes on the soft signs of inattention during the programme. During the initial testing she indicated that Nadia had severe problems with concentration and sustaining attention as well as all of the other soft signs of inattention. During post-testing she indicated that Nadia had shown improvement in behaviours of concentration and ability to sustain attention, but both were still rated as mild problems. She found no improvement on the soft signs of failing to finish projects, being disorganised, poor planning ability, absentmindedness and inattention, following direction, frequently losing things, difficulty staying on task and completing tasks.

According to the teacher Nadia showed deteriorations in attention span, distractibility, sustaining attention and difficulty staying on task and completing tasks.

Baseline, pre- and post-test ratings were in agreement between Nadia's mother and teacher on all soft signs of inattention. Only the severity by which they interpreted Nadia's behavioural problems differed. By the time of the final assessment, most of the soft signs were rated as mild problems by both parties. The only sign on which they differed was Nadia's ability to not loose or to frequently misplace things.

Discussion

During the 12-week period of this study, Nadia achieved improvement in terms of her motor proficiency and her parent reported substantial improvements in terms of the soft signs of her hyperactivity, impulsivity and inattentiveness from the pre to the post-test period. Nadia's teacher did not report the same extent of positive behavioural changes for Nadia in the classroom setting.

Harvey and Reid (1997) also found an improvement in the fundamental gross motor skills and fitness conditions of children with ADHD after participation

in an intervention programme. Their study found that fundamental gross motor performance and physical fitness of children with ADHD were substantially below average. Nadia did show signs of lower motor proficiency with initial testing, and she also showed improvement in motor proficiency over time. This reinforces the link between participation in formal gross motor skill development programmes and improvements in children's motor proficiency. Tirosh *et al.* (2006) argued that children who show signs of ADHD as well as show signs of motor deficiencies should be given opportunities to participate in motor development programmes that will address their skills at an early age in order to prevent these deficiencies from holding these children back in later life. Nadia's progress in terms of motor proficiency supports this position.

It is possible that Nadia would have experienced greater benefits from her participation in the "Purposeful Play" programme if her medication had not been changed mid-programme. Beyer (1999) reported that most of the research on ADHD has been on the difficulties in perceptual and fine motor skills and the effects of medication on performance. These findings suggest that children with ADHD who are not medicated tend to lack the ability to pay attention to relevant cues in performance situations. Nadia's medication was changed during the course of the programme. The programme was over before her new dosage had been stabilised. This destabilisation may have contributed to some of the behavioural setbacks she experienced during this six-week programme. At one point during the programme, Nadia showed signs of deterioration in her motor proficiency as well, which could have been a side-effect from the alteration in her medication dosage.

Another factor that could have played a role in Nadia's progress was a change in her home situation. Her parents had been out of town and her grandparents were staying with her at the time. As a very sensitive child, Nadia may have been unsettled by this change in her routine at home and as a result, struggled to maintain her concentration on the tasks at hand. Nadia's ability to concentrate and focus was better after her parents return as well, underlining the importance of routine and stability in Nadia's environment.

Future movement educational programmes for Nadia should be conducted in environments that are relatively minimalist, without any unnecessary pictures

and equipment lying around the room. The presenter of the sessions should also be the same person, and he/she should try to remain as consistent as possible, without major changes in clothing and physical appearance from session to session. One key to success with Nadia will be simplicity and repetition.

Soffer (2008) *et al.* mentioned that there are several challenges faced by clinicians and researchers working to understand ADHD specifically in girls. They noted that the potential of internalising the disorders is greater for girls with ADHD than for boys. It is therefore very important work on managing the impact of the soft sings on the child's daily living. This approach is recommended for Nadia.

Chapter Five

Results and Discussion- Case Study Two

The children who volunteered to participate in this study attend a school that was established for children with special educational needs associated with the signs of ADHD. The names used in reporting the results of this research are not the actual names of the children who participated. Information about the lessons presented is included in separate Appendices for each child.

Arno

Arno was an intriguing seven-year-old Grade 1 boy born in February 2001. He was an average build boy with rigid movements and tended to be very uncoordinated at times. Arno was diagnosed as having ADHD with borderline Autism Aspergers. He had received occupational therapy and speech therapy for three years. Arno took Ritalin with long acting release in the mornings, Stratera in the evenings and Risperdal twice a day for the effects of ODD (Oppositional Defiant Disorder) and OCD (Obsessive Compulsive Disorder). He appeared to be a bright young boy but tended to separate body and mind at times, removing himself from reality. Arno was very cooperative but tended to get very carried away by little things that attracted his attention and that he found interesting. He could get carried away when telling a story and lived the tale every time he told the story.

Baseline Assessment

Baseline assessment was completed during the four weeks prior to the beginning of the six-week intervention programme.

Observation

There were 12 children in Arno's specific class, which was a combination of Grade 1 and Grade 2 learners. The teacher was supported by an assistant teacher who worked with those individuals who needed extra help. On the day of the

observation in the classroom, Arno seemed to be a loner not only in class but also at break-time. Arno did not really interact with his other class members and tended to play and wonder alone at break and play-time. Arno usually found something of interest around the playground and amused himself by making up his own little story on what he was seeing. He would climb a tree or invent a scenario and then live that for the moment. The teacher tried her utmost to encourage Arno to interact and play with other classmates or play on the jungle gym or swings. However, he removed himself from the group, swinging alone or having his lunch and then again attending to something that attracted his attention around the playground.

In class his teacher had to constantly remind him to attend to the tasks at hand. She encouraged him to work a bit faster at completing the task at hand and not get too carried away by detail. Arno had problems staying focused on the task and tended to daydream as soon as he lost interest in what he was doing. As soon as he lost interest he would soon find something that interested him and started wondering off on his own little path of story telling, talking to himself and elaborating on the aspects of interest. He found it very difficult to stay in his seat and attended to the work at hand. He was very dependent on the teacher for feedback and affirmation that he was doing things correctly every step of the way. The teacher tried to encourage him to first finish the task and then ask for feedback, not getting up the whole time and moving around in the classroom between teacher and assistant. The teacher also encouraged him to work a bit faster at times. Arno tended to work at a very slow pace and therefore lagged behind in class struggling to finish on time for the next task. Arno was capable of working at a faster pace but frequently lost himself in his own little world, getting carried away by detail he creates for himself during execution of tasks.

Arno was constantly “on-the-go” and showed signs of excessive movement which was not put to good use. He was easy excited, had difficulty remaining seated, twisting, wiggling, manipulating objects, fidgeting and squirming and was very restless. Arno did not seem able to play quietly and was talking excessively throughout the day. He was very impulsive, interrupting conversations and intruding on others. He did not wait for directions and failed to follow the rules of

games. He displayed a very domineering personality and wanted constant attention. Arno was also very disorganized, absentminded and inattentive. He had poor planning abilities and failed to finish projects. Arno was easily distracted, had a short attention span and difficulty sustaining attention, staying on task and completing tasks. He often lost things and tended to have temper tantrums.

Arno's ADHDT Results

Arno's mother reported that he showed many of the signs of hyperactivity, impulsivity and inattention on the ADHDT (See Table 4). His mother noted that the signs became more severe during the afternoons when Arno's medication started wearing off. She rated Arno's excessive running, jumping and climbing as severe problems and that he was constantly on the go and had lots of energy. He struggled to stay seated especially during mealtimes and excessively talking, telling long and intriguing stories about his latest obsession or movies. She felt that Arno had severe problems being loud, twisting and wiggling, and that he was easily distracted, grabbed objects, and constantly manipulated objects. She found that Arno was unable to play quietly and was very restless, fidgeted and squirmed a lot.

His mother also reported that Arno was extremely impulsive when it come to thinking before acting and had a tendency of interrupting on conversations and intruding on others.

Arno showed severe problems with inattention on the ADHDT. He had difficulty staying on task and his mother had to constantly supervise him during homework and activities. He frequently lost things and this tended to lead to temper tantrums. He was disorganized, had poor planning ability and was very absentminded and inattentive. Arno was easily distracted, had a short attention span, having difficulty sustaining attention, staying on task and completing tasks. He failed to wait for directions to start on something or for someone to finish directions.

Table 4

Soft signs of behavioural problems for Arno experienced by parent

Category on ADHDT	Soft Signs on ADHDT
Hyperactivity	Loud Constantly on-the-go Excessive running, jumping and climbing Twists and Wiggles Easily excited Grabs objects Excessive talking Difficulty remaining seated Constantly manipulating objects Inability to play quietly Fidgets Restless Squirms
Impulsivity	Acts before thinking Fails to wait one's turn Difficulty waiting one's turn Blurts out answers Impulsive Interrupts conversations Intrudes on others Does not wait for directions Fails to follow rules of games
Inattentiveness	Poor concentration Fails to finish projects Disorganized Poor planning ability Absentminded Inattentive Difficulty following directions Short attention span Easily distracted Difficulty sustaining attention Difficulty staying on task Difficulty completing tasks Frequently loses things

Arno showed many of the soft signs found on the ADHDT according to his teacher (See Table 5.). She reported that Arno showed no signs of hyperactivity or impulsivity on the ADHDT. This could be because of his medication, because his mother mentioned that his medication tended to wear off during the afternoon. Arno showed most of the soft signs of inattention on the ADHDT, including very poor concentration abilities and failing to finish projects. He was disorganized, had poor planning ability and a short attention span. The teacher found that he was

extremely absentminded. He had a short attention span and was easily distracted, found it difficult to sustain attention, stay on task and complete tasks.

Table 5.

Soft signs of behavioural problems for Arno experienced by teacher

Category on ADHDT	Soft Signs on ADHDT
Hyperactivity	None
Impulsivity	None
Inattentiveness	Poor concentration abilities Fails to finish projects Inattentive Disorganized Poor planning abilities Short attention span Absentminded Frequently losing things Difficulty staying on task Difficulty sustaining attention Difficulty completing tasks

Arno's Motor Proficiency

Baseline testing on the BOTMP Short Form was completed four weeks prior to the beginning of the intervention programme. Arno scored 42 out of a possible 85 on the test. His scores were particularly weak on the variables of:

Manual dexterity

Bilateral-coordination

Balance

Speed and agility

Strength

Intervention Programme

BOTMP Pre-Test

On the day of the BOTMP pre-test during the first week of the intervention programme, Arno simply attended to too much detail and it took a lot of time getting him through the various subtests on the BOTMP. He saw the environment around him in a lot of detail and could not disregard things that were unimportant at that time. Arno talked excessively and asked a lot of questions when either the environment or the objects in the environment were new to him. He was very impulsive and acted before instructions had been given, at times getting so carried away that something had to be done to get him back to reality and refocused (e.g. taking the ball out of his hand, putting your finger under his chin and forcing him to make eye contact with you. Using words like..."stop", "listen" and "focus").

The results of the second administration of the BOTMP found that Arno's scores were low on the following variables:

Manual dexterity.

Bilateral coordination.

Balance.

Agility.

Strength.

He found the use of both the upper and lower extremities in completing a task to be very challenging. When working at his own pace he managed to complete some of these more challenging tasks, but as soon as speed or distance was introduced to the test, his skills tended to "fall apart." Arno's overall score was 44 out of a possible 85 on the BOTMP. His baseline score had been 42 out of a possible 85.

Purposeful Play Sessions

The intervention programme for Arno also began the first week in August and was conducted every Tuesday for six weeks. His 30-minute session was usually at 11:30. A review of the lesson plans documented the overall programme focus in terms of the development of his attentional skills (see Figure 20). "Controlling distractibility" was the most common lesson focus, followed by "controlling time-on-task" and "discriminating among cues effectively."

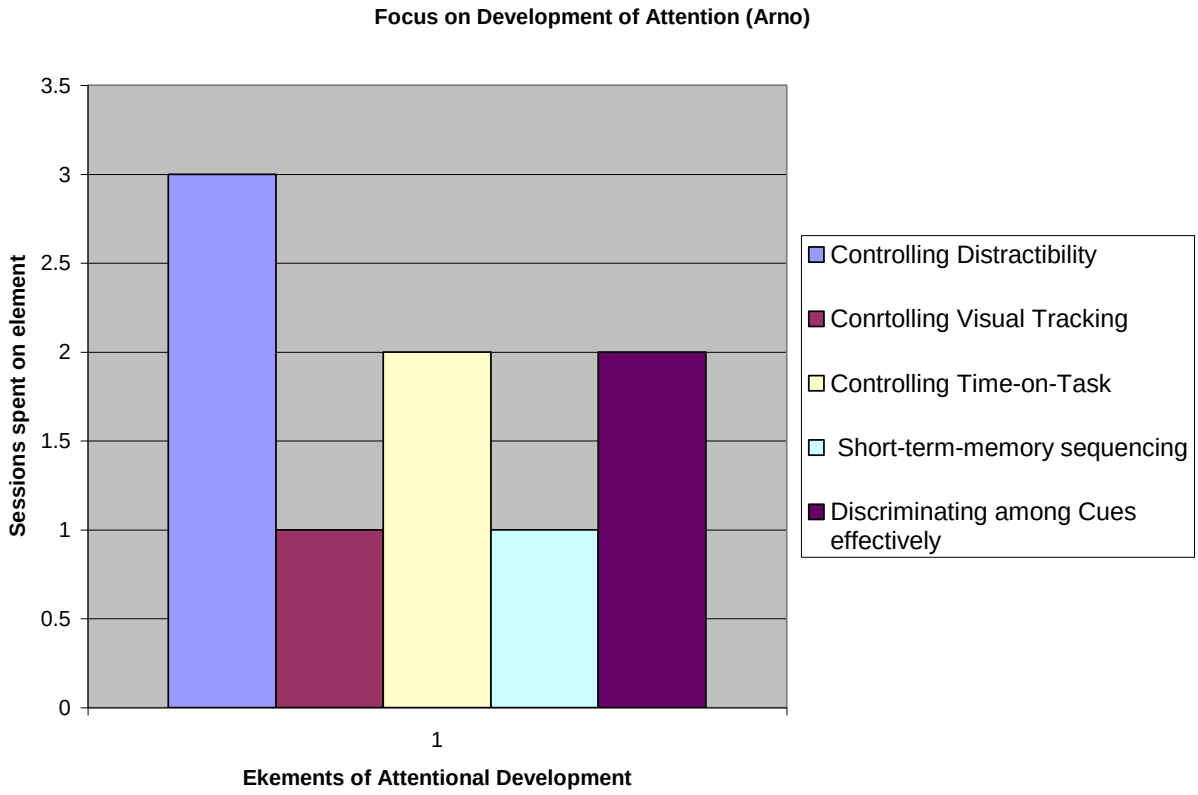

Figure 20

Focus for the development of Arno's attentional skills

The overall programme focus on sensory-motor content is reported in Figure 21. Activities that developed body awareness, proprioceptive sensitivity and visual skills development were the most frequently presented for Arno. The predominant teaching strategies used to support Arno's

participation during the programme were verbal cues, immediate feedback, demonstrations and motivational comments (see Figure 22).

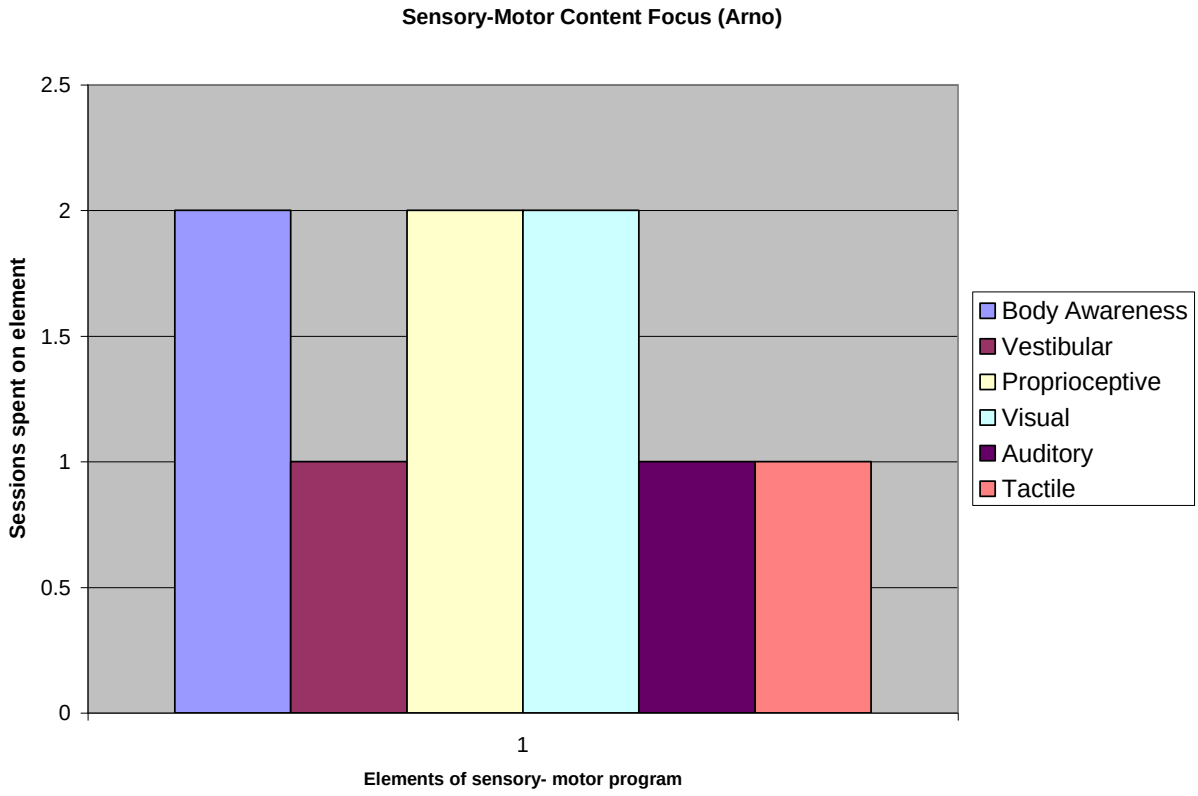

Figure 21

Focus for the development of Arno's sensory-motor systems

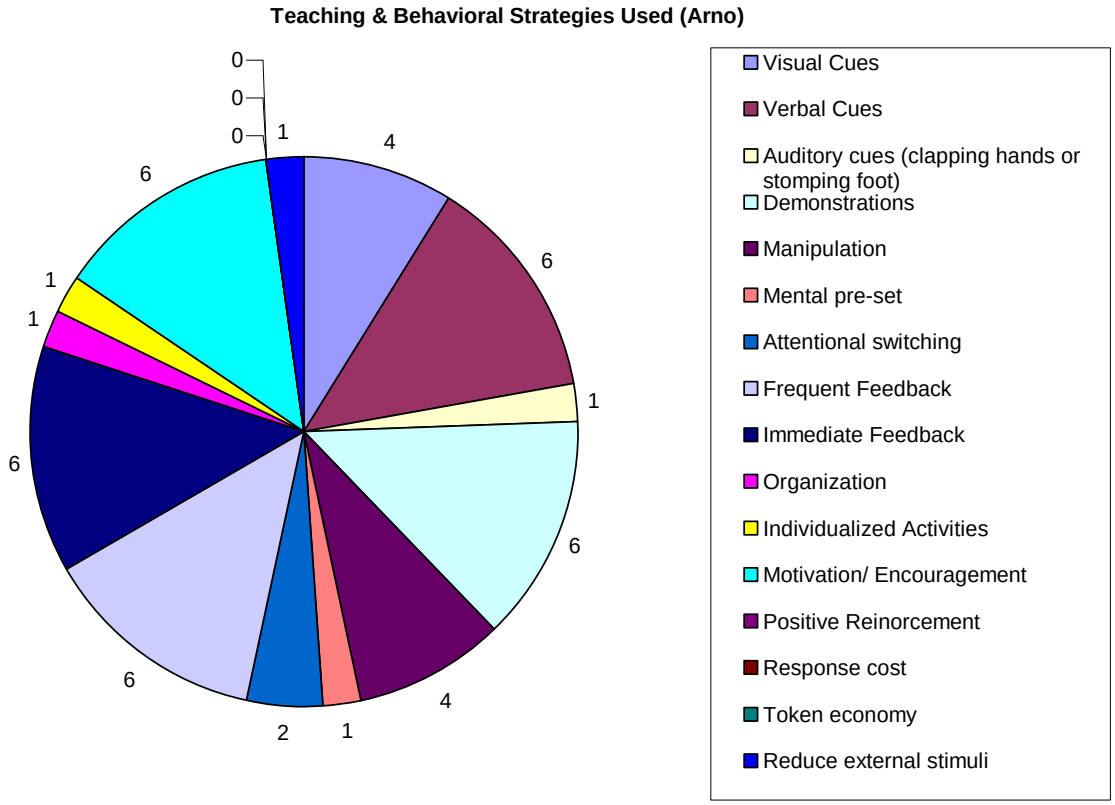

Figure 22

Predominant teaching strategies used during Arno's sessions

Session One

During the first session of the programme the focus was on developing proprioception and the vestibular system. All exercises on the floor and Swiss ball were focused on testing proprioception and strengthening the core muscles needed for postural control. Arno was extremely weak in the core and struggled to keep his extremities still during activities focused on the core of his body. His weak core stability contributed to his difficulties staying in his seat in the home environment. His constant shifting in his seat may be efforts on his part create an over stimulation of his vestibular and proprioceptive systems. According to Solan *et al*. (2007) in addition to more commonly known deficits in balance and posture, problems with vestibular function can also be associated with deficits in object recognition, spatial navigation, learning and memory. One mechanism by which

vestibular disorders adversely affect attention is the distracting influence of increased body sway and postural lean. Additionally, vestibular disorders are often accompanied by associated psychological conditions, which may include anxiety and depression, both of which can negatively affect the cognitive resources available for information processing.

Arno referred to his body as a machine and tended to separate body and mind, referring to his body as an object. Overall he had a good sense of body awareness but his lack of core stability had a negative influence on effective movement. His inability to keep focused and stay on track caused him to make unnecessary mistakes in conducting body awareness tasks. Instructions had to be repeated a few times during the execution tasks to keep him focused and cues had to be repeated to remind him to finish tasks. . His tendency towards elaboration and excessive talking caused him to lose focus and instructions had to be repeated again and again. Constant visual contact, refocusing and repetition was needed to keep Arno focused during a session.

Homework after session one. After the first session Arno was asked to practice the “bridge” formation on the floor at home, a core stabilizing exercise and he had to practice jumping from tile to tile (in blocks) at home, first double foot and then one-legged hops.

Session Two

The focus of the second session was on visual tracking and coordination. The session was conducted outside and it was soon learned that Arno was easily distracted by things in the surrounding environment, such as leaves and butterflies. Once he became distracted it was very hard to get him refocused. He was very aware of other people and ongoing activities in the background even when he only heard them and did not see the activity. Arno struggled with manipulation of objects, but showed some hand-eye and foot-eye coordination skill at manipulating bigger objects but as soon as either the object decreased in size or he was encouraged to move faster, he found it very difficult to complete the task. Because he attended to everything around him he found it very difficult to

keep his attention on the task at hand and sometimes his performance seemed to fall apart.

Not all of the activities planned for this session were completed because of Arno's inability to stay focused, distractibility and tendency to work at his own pace. Concurrent feedback, reinforcement and visual cues where needed to keep him on track and allow him to successfully finish some of the tasks. Arno showed a lot of unnecessary movements, wiggling, squirming and restlessness during activities and was easily irritated by the environment which caused even more distractibility. Without repeating instructions and cues he soon failed to keep on track and started "doing his own thing."

Homework after session two. At the end of this second session he was told to practice his modified juggling skills at home. This entailed two socks being folded into two little balls and then juggling with these "balls" like he was taught during the session. He was also asked to practice his one-handed throwing against a wall or with a friend or family member.

Session Three

The third session focused on body awareness and memory sequencing. Arno showed good body awareness but tended to struggle with memory sequencing. When listening to directions and instructions he tended to remember the first and last part of the instructions but failed to remember the middle part of the instructions. The more time spent making the sequence more visual, the more he showed signs of improvement and became more capable of remembering the middle section of instructions. When he forgot what to do, he would make up his own link in the activity which caused him to "lose the plot" because he became so carried away by his creativity. At the end of the session Arno was supposed to conduct some of the activities while standing on the bosu ball but he was unable to do this because his balance was so weak that he struggled staying on the bosu ball enough to complete the activity.

Homework after session three. At the end of this session Arno revealed that he did not practice the previous weeks' "homework" that often. Arno was encouraged

to practice his hops and one-leg balance at home, with eyes open and eyes closed.

Session Four

Fourth session focus was on time-on-task activities and mental set by means of verbal cueing. Each activity and the means by which it should be conducted were first discussed with Arno, and then he was asked to repeat the instructions and describe how he planned to go about executing the task. This mental set and step-by-step rehearsal helped Arno during the execution of the task. During execution he was asked to tell the session leader step-by-step what he was doing and what would happen next. The session leader had to be very strict to keep him on track with what he was busy, not allowing him once to wonder off since this leads to a huge struggle getting Arno refocused. This self-talk helped him a lot to stay on track and not be distracted by external stimuli or internal stimuli because he concentrated on his own voice and instructions throughout the activity.

Arno tended to do certain things too thoroughly and put too much focus on detail which led to a very slow pace of doing things and soon made him tired. He needed constant reminders of what was important and did respond well to encouragement, visual cues, refocusing and verbal cues. Arno found it very difficult waiting and acted very impulsively; starting with some activities even before instructions had been completed.

Homework after session four. Arno received no homework after this session but was asked to try and practice a previous session's modified juggling activity.

Session Five

The fifth session was the week used various colours, shapes and sizes. Colours varied from blue, green, yellow, red and orange. The shapes of the targets varied from a target hoop on the wall to a bucket or hoop on the floor, as well cones and beacons. Sizes of the targets and the aiming equipment varied. Targets were small hoops, large hoops, buckets or beacons. Throwing objects varied from beanbags to tennis balls, different colour softballs and handballs. Target games

were the content focus and they challenged aiming and distractibility. Attentional focus directed toward different cues and the sensory-motor focus was on the visual system, as well as the proprioceptive system to a lesser degree (See Figure 20 & 21).

Arno enjoyed all the activities although his success rate was very poor at all aiming games. He needed constant encouragement as he easily tired of focusing on the target and tended to give up on the task as soon as he did not manage to successfully complete it. He needed to be reminded of the outcome of every single activity. The directions had to be repeated before each activity. He struggled with the transfer of instructions from one trial to the next of each activity. Arno's overall motor performance and body movements were very rigid and immature for his age. He overcorrected on tasks each time and struggled with force and strength control. Teaching and behavioural strategies (See Figure 22) during the session were elements of eye contact and demonstration, refocusing and verbal cueing as well as a lot of motivation to keep him on track.

Homework after session five. Arno was instructed to use all possible items he could find, and that he may use to throw with, at home and practice throwing it into buckets, wash baskets etc.

Session Six

During the sixth session the focus was on one of the previous sessions with which the individual struggled most. It was however very hard to keep Arno focused throughout the session as he was locked up in his own world, detached from reality and referring to his body as the machine, having no 'connection' between body and mind. Constant feedback and encouragement was needed to keep him on track and a few time-out sessions were also needed to get him back to reality and refocused on what was happening around him. Verbal cues and feedback was needed throughout to keep him on track.

Post-programme Assessment

The BOTMP was administered immediately after the conclusion of the intervention programme during the 10th week of the study. The parents and the teacher were asked to continue to complete the ADHDT for weeks 11 and 12 in order to determine if the programme had any impact on Arno's behaviour. Changes in motor proficiency were tracked by comparing the baseline results with the pre-test and post-test results. Changes in ADHD were tracked first by drawing a graph of the changes in hyperactivity, impulsivity and inattention. Then, comparison of changes in the soft signs in each category were tracked by comparing week one reports (baseline) with week 5 (pre-test) and week 12 (post-test) results.

Change's in Arno's Motor Proficiency

During post-testing Arno seemed much calmer and focused, being able to tend more effectively to tasks and able to complete tasks faster and more accurate, without asking as many unnecessary questions as during the pre-testing. He was more cooperative and waited for instructions to be completed before he began with an activity. He showed good improvement on subtests of bilateral coordination and upper-limb coordination. His agility and balance did not improve. Arno's total score on the BOTMP shortform test improved to a 59 score out of a possible 85 (See Figure 23).

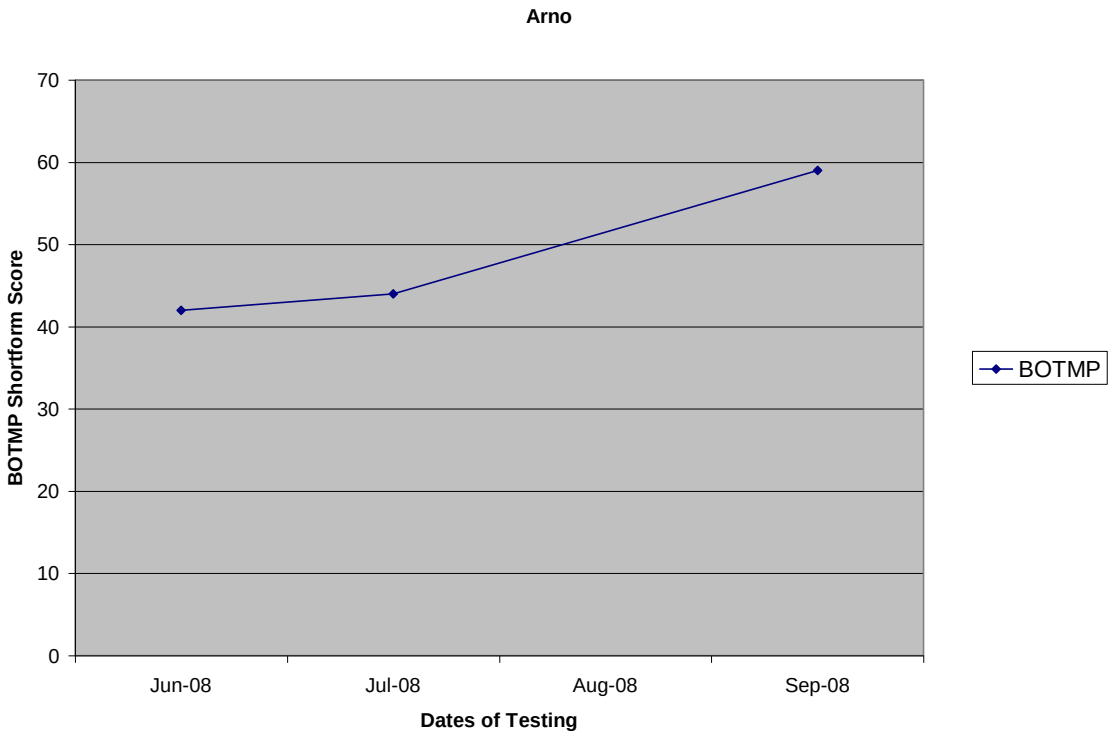

Figure 23

Changes in BOTMP results for Arno

Arno's results for the baseline, pre- and post-test on the BOTMP were made up out of 8 variables (See Figure 5.5).

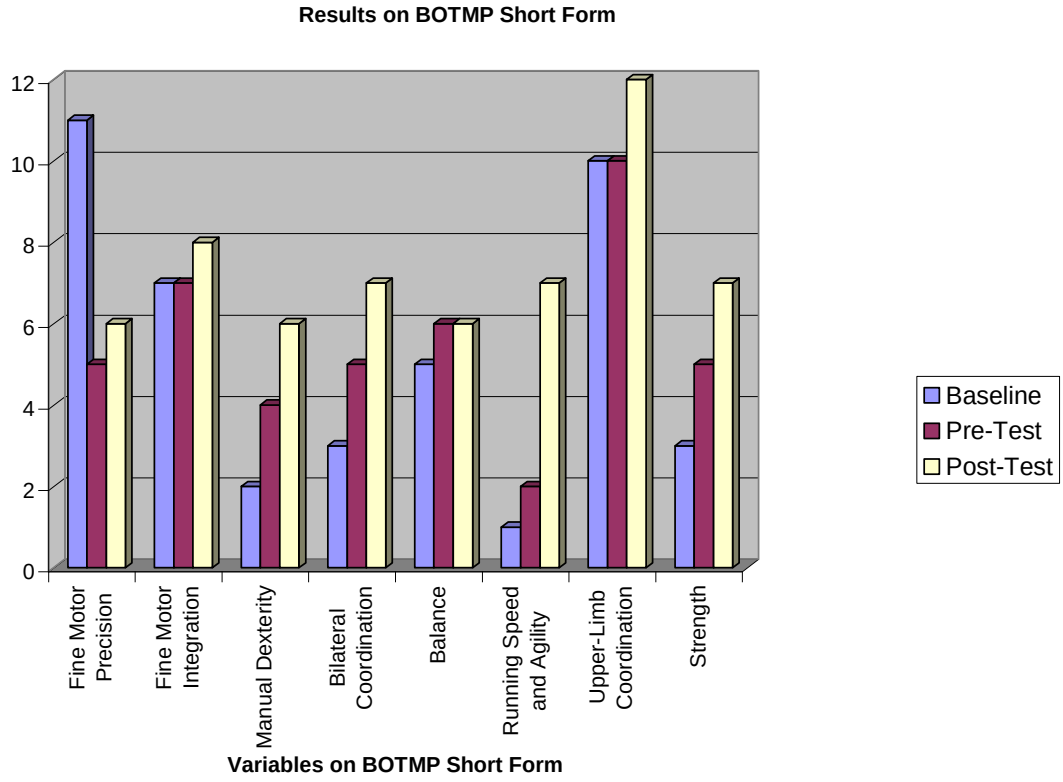

Figure 24

Changes in BOTMP according to each of 8 variables

1. Fine Motor Precision

On the baseline test Arno faired well on the drawing lines through paths tasks, but faired very badly on the folding paper task. During pre-testing he not only struggled with the task on folding paper but his ability to draw lines through paths also deteriorated. His results for drawing lines through paths again improved on the post-test but his ability to fold paper deteriorated even more. Arno being too hasty at times and not waiting for some instructions to be finished might have an impact on the paper folding tasks.

2. Fine Motor Integration

Arno struggled copying the star on the baseline test but was able to score all of the points on copying the square. During pre-testing his ability to copy the star improved and he was able to score 4 of the 5 points on the copying task for the square and 3 out of 5 for copying the star. During post-testing Arno was able to copy the square with great success but still could not achieve all the points on the star copying task, he did however score 4 out of five for copying the star on the post-test.

3. Manual Dexterity

On the baseline test Arno was only able to transfer between 5 and 6 pennies during the 15 seconds and scored 2 points on the test. During pre-testing he improved on the test being able to transfer between 9 and 10 pennies and scoring a total of 4 points and on the post-test he was able to score 6 points by transferring between 13 and 14 pennies during the 15 seconds of the task.

4. Bilateral Coordination

On the baseline test Arno was not able to score any of the points on the same side synchronized task. This means that he was not able to have a successful jump out of a possible 5 attempts, and 3 points on the tapping fingers test, which means that he was only able to complete between 5 and 9 successful taps out of a possible 10. During pre-testing Arno was able to jump between 2 and 4 jumps with same side synchronized and scored 2 points on the task. He scored 3 points on the tapping task, performing between 5 and 9 synchronized taps. On the post-test he did improve and scored a maximum on the tapping score and the jumping task. He was able to perform 5 synchronized jumps and 4 points on the tapping task as he was able to perform the maximum of 10 synchronized taps during the task.

5. Balance

During baseline, pre- and post-testing Arno was able to score the maximum amount of points. He had difficulty with his ability to balance on one leg on a balance beam for 10 seconds with his eyes open. During baseline testing he was

only able to balance for between 1.0 and 2.9 seconds on the beam, scoring 1 point on the task. During pre-testing he did show improvement and was able to balance for between 3.0 and 5.9 seconds, scoring 2 points on the task. On the post-test he did not show any improvement on his ability to balance and his score was the same as on the pre-test, scoring 2 points on the task.

6. Running Speed and Agility

During baseline testing Arno was only able to do between 1 and 2 correct hops, earning himself 1 point of the task. During pre-testing he was only able to do between 3 and 5 successful hops, earning himself 2 points on the test. During post-testing he improved and was able to complete between 25 and 29 hops.

7. Upper-Limb Coordination

During baseline testing Arno was able to perform for successful drop and catch actions and between 8 and 9 dribbling actions on the tests. He scored 4 points on the drop and catch task and 6 points on the dribbling task during baseline testing. During pre-testing he was able to perform 5 successful dropping and catch actions and between 6 and 7 dribbling actions on the task, earning him 5 and 5 points respectively. On the post-test he showed even more improvement, being able to drop and catch the ball, scoring a maximum of 5 points on drop and catch and 7 on the dribbling task.

8. Strength

During baseline testing it was found that Arno could only perform between 6 and 10 successful sit-ups during the 30 seconds and was unable to perform any correct push-ups. During pre-testing his score on the push-ups improved and he was able to score 2 points on the task, performing between 3 and 5 push-ups. His score on the sit-up test was the same as on baseline testing. During post-testing his score on the push-up task improved to a score of between 6 and 10 and he scored 3 points. His sit-up score also improved to between 11 and 15 sit-ups and he was able to score 4 points on the task.

Changes in Arno's ADHDT Results

Changes in ADHDT results by the parent could not be reported because the parent never submitted the results at the end of the study. Efforts were made to contact the parent several times, however, the mother did not reply. Finally, the researcher phoned the parent and was told that she had dislocated her right shoulder earlier during the programme and that was why she was unable to complete the ADHDT forms.

The ADHDT results reported by the teacher at the end of the study showed a huge improvement for Arno in the category of inattention. Although some of the soft signs of inattentiveness did not disappear they did improve over time (See Figures 25).

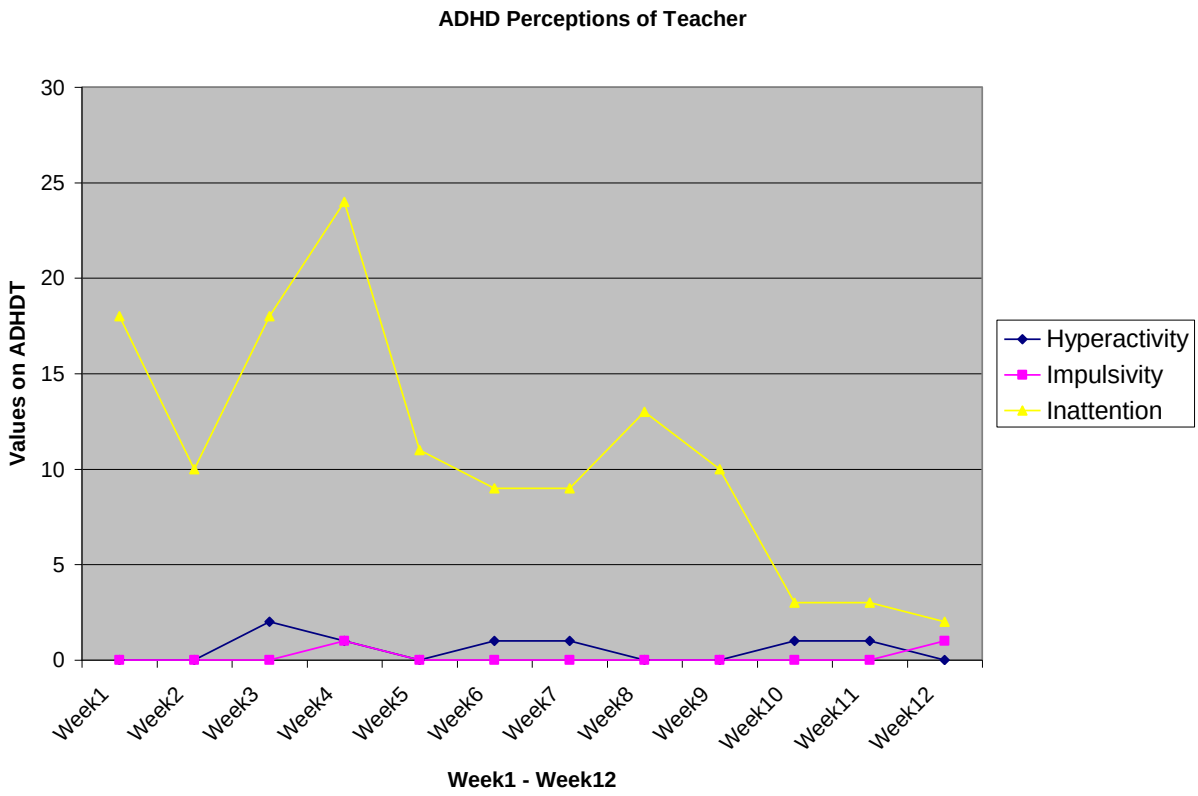

Figure 25

ADHDT results submitted by Arno's teacher over 12 weeks

Differences in Perceptions on Arno's Hyperactivity

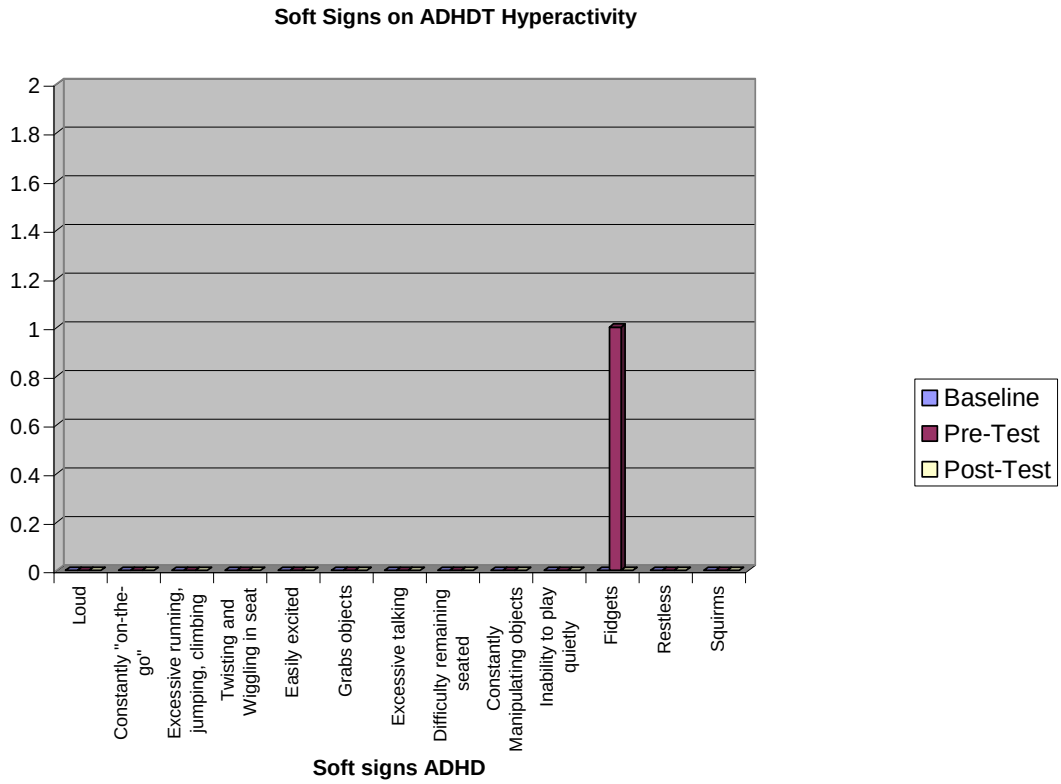

Figure 26

Soft signs of hyperactivity reported by Arno's teacher

Arno's teacher reported no severe problems with any of the soft signs of hyperactivity during the study. At one time during the programme she did report that Arno showed mild problems with fidgeting in class, but this was just after a minor alteration in his medication and towards the end of the programme, which she regarded as normal.

Differences in the Perceptions of Arno's Impulsivity

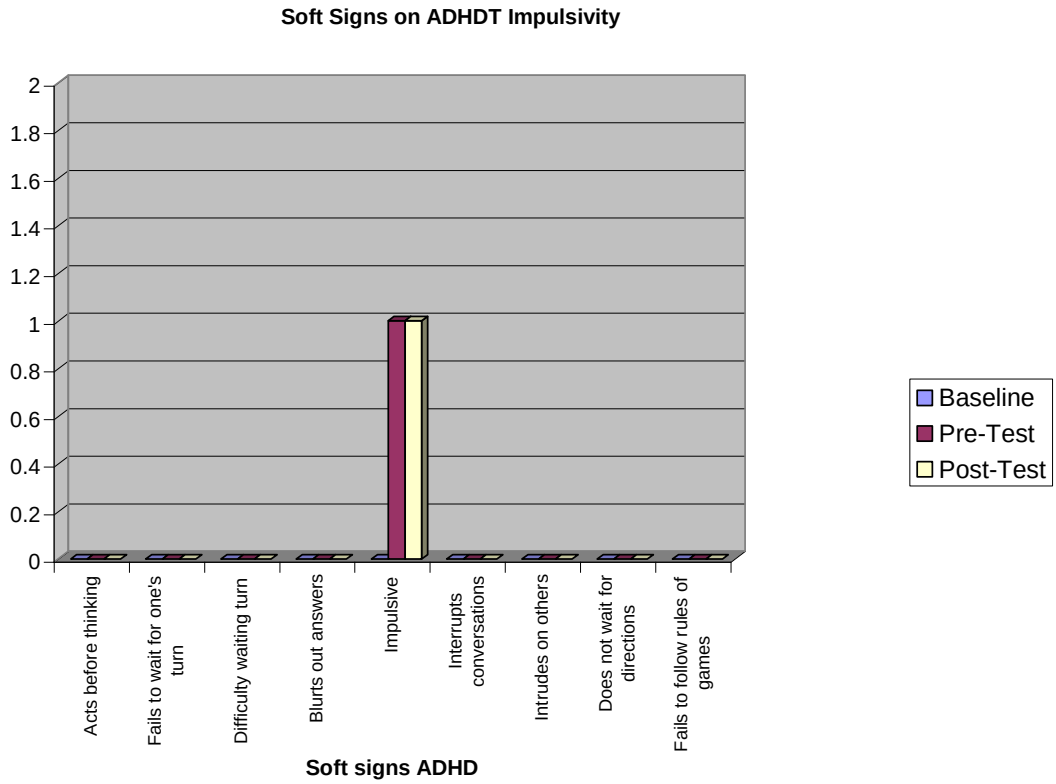

Figure 27

Soft signs of impulsivity by Arno's teacher

Arno's teacher reported no severe problems with any of the soft signs of impulsivity during the study. During the programme she did report that Arno showed mild problems with impulsivity in class. This stayed a mild problem throughout the duration of the programme.

Differences in the Perceptions of Arno's Inattention

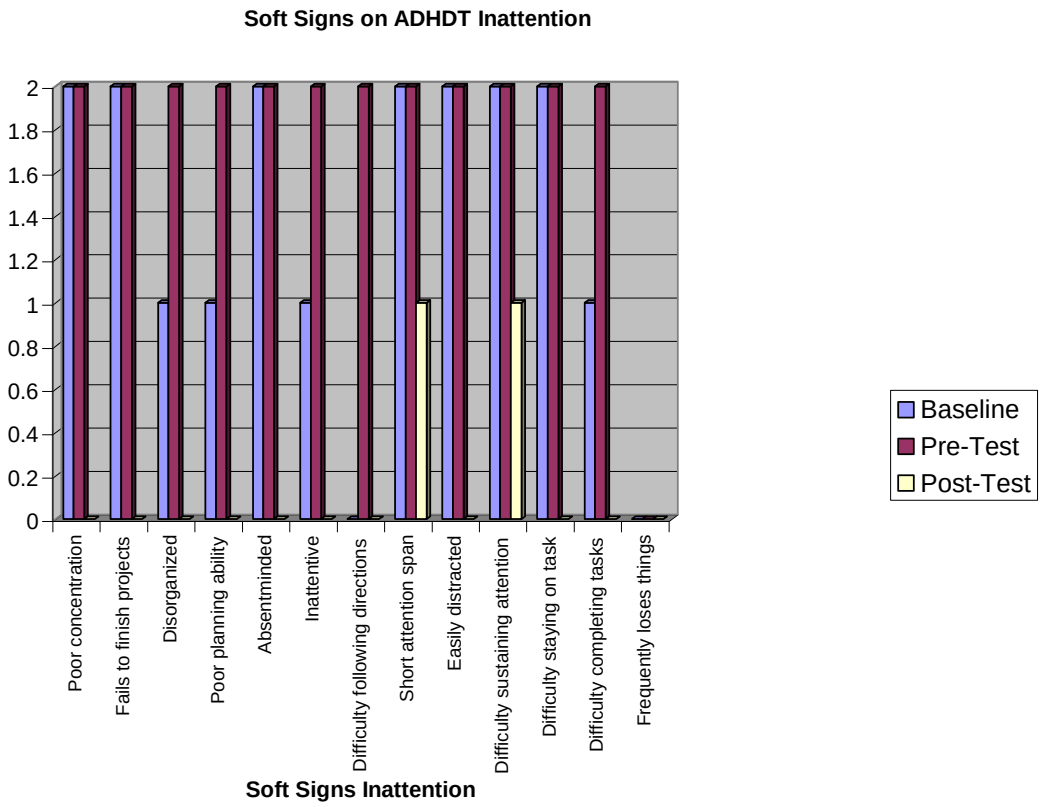

Figure 28

Soft signs of inattention reported by Arno's teacher

Arno's teacher reported several changes on the soft signs of inattention during the duration of the programme. During the initial testing she indicated that Arno had severe problems with concentration, failing to finish projects, attention span, distraction, sustaining attention and staying on task. He showed mild problems with being disorganized, poor planning, inattention, and ability to complete tasks. Some of the severe problems stayed the same during the programme, bur the milder problems also became quite severe at one stage. These all however changed by the end of the programme. The short attention span and difficulty sustaining attention in class still posed problems at the end of the programme but they were not seen to be as severe anymore. It is difficult to

say if these changes were brought on by the alteration in Arno's medication during the programme or by the effects the programme had on Arno's abilities.

Discussion

Arno did show improvement in terms of his motor proficiency (Figure 23) and his teacher did report substantial improvements in terms of his inattentiveness from the pre to the post-test period. The teacher also reported that the mother had mentioned that she had seen an improvement in Arno's abilities at home to complete household tasks and to remember instructions. He appeared to be very enthusiastic about participating in the Purposeful Play sessions.

Harvey and Reid (1997) conducted a study describing the fundamental gross motor skills and fitness of children with ADHD. The study found that fundamental gross motor performance and physical fitness of children with ADHD were substantially below average. Arno did show signs of lower motor proficiency with initial testing. The improvements he achieved in motor proficiency over time show the potential of a gross motor programme on improving children's motor proficiency. These kinds of motor proficiency improvements can help children with ADHD become more successful in completing their everyday tasks and help them to perform on the same physical, motor and cognitive level as their peers.

Tirosh (2006) *et al.* also mentioned that children who suffer from ADHD who show signs of motor deficiencies should have their deficits addressed at an early age to minimize the negative impact on their social and psychological development. Arno's mother reported that she did experience an improvement in Arno's ability to finish household tasks and his ability to follow instructions, which supports the importance of providing individualized gross movement programmes focused for children who have ADHD.

Arno did benefit by participating in the Purposeful Play programme which combined sensory-motor development activities with attentional skills development. His mother commented that he had been taking part in extramural activities the previous year and that they could manage his hyperactivity better during the afternoons if he had had an active outlet forgetting rid of some energy.

Klimkeit, *et al*. (2005) reported that the performance of children with ADHD was characterized by both slow and inaccurate responding. In their study, slow responding in ADHD reflects problems with the attentional processes associated with preparation phase for single movement, rather than with problems in the execution phase of a movement. Slow movement preparation was not evident in the medicated ADHD group, suggesting that stimulant medication tends to normalize the attentional processes associated with slow movement preparation. Inaccurate responding in ADHD reflected problems with response inhibition, set-shifting, selective attention, impulsive premature responding, and difficulties in maintaining vigilance. This is consistent with the suggestion made by Arno's mother that his hyperactivity increased during the afternoon when his medication tended to wear off. It appears that for Arno, effective medication and participation in the Purposeful Play programme helped him experience some self-management skills that may help him be more focused in performing tasks in everyday life and living situations.

Arno was a very special case because he showed signs of Aspergers Syndrome and ODD. Kennedy (2002) stated that when a child with ADHD shows any signs of co-morbid factors or co-occurring diseases the programme leader should keep in mind what the effects of those co-morbid factors may influence the way in which the child functions. The programme leader should then take all these into consideration and plan the individual sessions accordingly, finding behavioural and teaching strategies that will best suit the needs of the individual case. Griffin *et al*. (2006) described children with Aspergers Syndrome as having motor problems and being over-stimulated by crowded and cluttered rooms and by situations with overwhelming visual stimulation. This description is compatible with Arno's experiences, in which he showed signs of improvement in his abilities to attend and focus on tasks when the environment and the individual presenting the session stayed the same. The environment in which his future sessions are conducted should be relatively sterile, without any unnecessary pictures and equipment lying around the room. The key to success with Arno will be simplicity and repetition; moving initially at his own pace and then encouraging self-talk as he attempts to pick-up the pace.

Chapter Six

Results and Discussion- Case Study Three

The children who volunteered to participate in this study attend a school that was established for children with special educational needs associated with the signs of ADHD. The names used in reporting the results of this research are not the actual names of the children who participated. Information about the lessons presented is included in separate Appendices for each child.

Ernie

Ernie was a quiet ten-year-old Grade 3 boy. He was tall and slender for his age and appeared to be strong and athletic. He enjoyed physical activity and movement but lacked motivation and was easily bored. Ernie was very cooperative but lacked the motivation to sustain activities and frequently asked questions like, “when are we done,” how long will it take,” “how many more?” He did show some interest in ball games and tended to stick to those activities and games in which he took an interest.

Baseline Assessment

Baseline assessment was completed during the four weeks prior to the beginning of the six-week intervention programme.

Observation

Ernie attended a school established for children with special educational needs, like children who have been diagnosed with ADHD. There are only eight children in his Grade 3 class. In the class atmosphere, Ernie had difficulties as soon as he gets into his work. The teacher had to tell him not to get lost in all the detail, as he tended to focus a lot on detail in his work and therefore took longer at completing tasks. He was apprehensive when interrupted and did not immediately respond when spoken to when busy working. He found it very difficult to switch to doing something if he was already busy on another task

During observation at the school, Ernie seemed to interact well with fellow students. He took in all the games at break time and found it very disappointing if he is not able to have break time. He enjoyed movement and was always barefoot and on the go. Most of the time Ernie and his friends would be playing some sort of game where a lot of activity, movement and running were involved. Ernie was constantly “on-the-go”, twisting, wiggling, fidgeting, squirming, and restless when in his seat. He showed signs of poor concentration, failed to finish projects, had poor planning ability, was absentminded and had difficulty following directions. He had a very short attention span, was easily distracted and found it difficult sustaining attention.

Ernie’s ADHDT Results

Ernie’s mother reported that he showed no signs of hyperactivity and impulsivity at home and on weekends but severe signs of inattention on the ADHDT (See Table 6). She experienced mild problems with Ernie being disorganized and frequently losing things.

His mother experienced severe problems with Ernie being very absentminded. Ernie failed to finish projects, had problems with following directions and experienced problems sustaining attention and was easily distracted. Ernie also found it difficult completing tasks, had poor concentration and a very short attention span, difficulty staying on task and finishing projects.

Table 6

Soft signs of behavioural problems reported by Ernie's parent

Category on ADHDT	Soft Signs on ADHDT
Hyperactivity	None
Impulsivity	None
Inattentiveness	Poor concentration Fails to finish projects Disorganized Poor planning ability Absentminded Inattentive Difficulty following directions Short attention span Easily distracted Difficulty sustaining attention Difficulty staying on task Difficulty completing tasks Frequently loses things

Ernie showed many of the soft signs identified on the ADHDT according to his teacher (See Table 7). She reported that Ernie showed some signs of hyperactivity and impulsivity. He showed most of the soft signs of inattention. Ernie was extremely absentminded. He failed to finish projects and had difficulty following directions. He also had difficulty sustaining attention and was easily distracted, finding it difficult to complete tasks.

Table 7

Soft signs of behavioural problems reported by Ernie's teacher

Category on ADHDT	Soft Signs on ADHDT
Hyperactivity	Twisting and wiggling in seat Easily excited Constantly manipulating objects Fidgets Restless Squirms
Impulsivity	Acts before thinking Fails to wait one's turn Difficulty waiting turn Blurts out answers Impulsive
Inattentiveness	Fails to finish projects Absentminded Difficulty following directions Easily distracted Difficulty sustaining attention Difficulty completing tasks

Ernie's Motor Proficiency

Baseline testing on the BOTMP was completed four weeks prior to the beginning of the intervention programme. Ernie scored 65 out of a possible 85 on the test. His scores were particularly weak on the variables of:

Speed and agility

Strength

Intervention Programme

BOTMP Pre-Test

On the day of the pre-test, Ernie was reluctant to try new and unfamiliar things. It took some motivation to get him through some of the activities in the BOTMP short form test. He was very impulsive and acted before instructions had been given. Ernie tended to get so carried away. He had a way of taking a ball or object of interest and then started his own game on the side, taking a lot of special effort to convince him to return to the activity that had been planned.

The results of the second administration of the BOTMP found that Ernie's scores were low on the following variables:

Manual dexterity

Agility

Strength

He found the use of both the upper and lower extremities in completing a task to be very challenging. When working at his own pace he managed to complete some of these more challenging tasks, but as soon as speed or distance was introduced to the test, his skills tended to "fall apart." Ernie was easily bored and wanted to finish activities quickly, fast no matter what the outcome might be. He had to be encouraged to focus on the outcomes of each specific task, for example, accuracy. His seemed to lose his coordination as soon as the element of speed or excitement was introduced. Ernie's overall score was 64 out of a possible 85 on the BOTMP. His baseline score had been 64 out of a possible 85.

Purposeful Play Sessions

The intervention programme for Ernie also began the first week in August and was conducted every Tuesday for six weeks. His 30-minute session was usually at 12:00, but was later moved to 12:30 because he had complained about not having break with his friends. The teacher consulted with the researcher, and it was agreed that Ernie did need a break before the structured

participation in the Purposeful Play programme. A review of the lesson plans documented the overall programme focus in terms of the development of his attentional skills (see Figure 29). "Controlling distractibility" was the most common lesson focus, followed by "controlling time-on-task" and "discriminating among cues effectively."

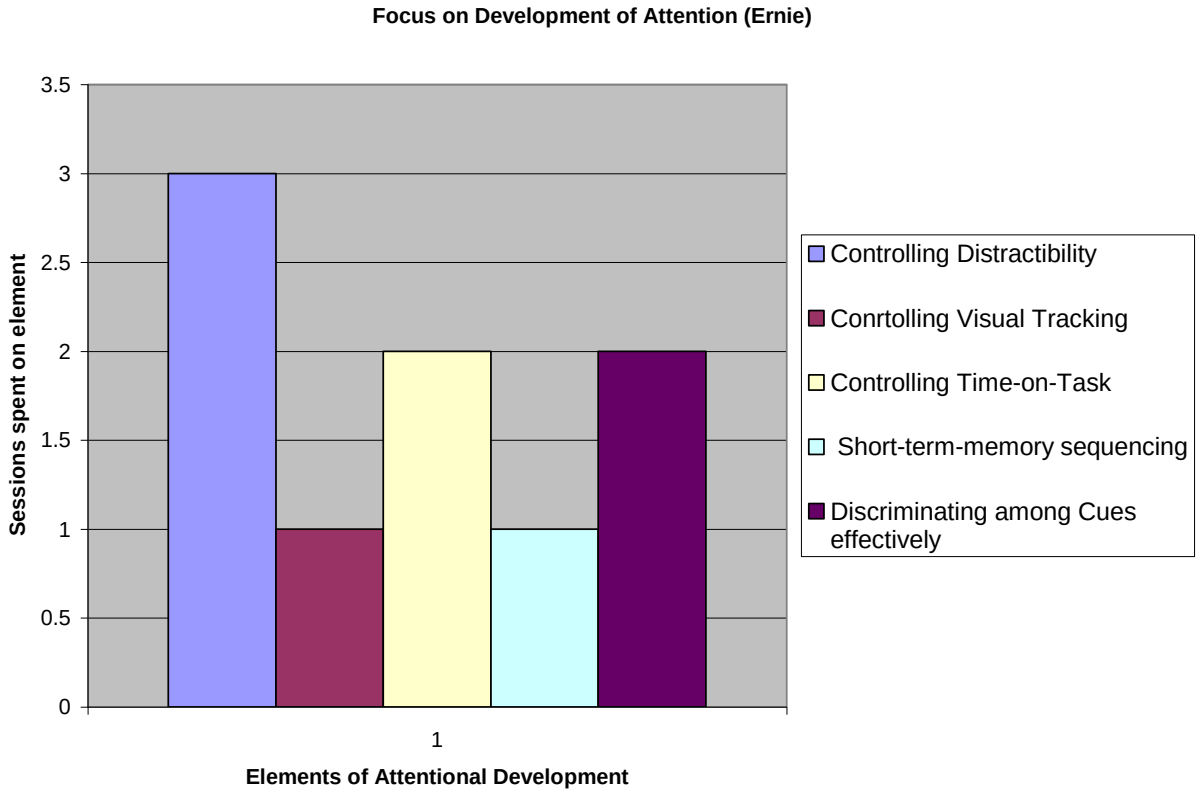

Figure 29

Focus for the development of Ernie's attentional skills

The overall programme focus on sensory-motor content is reported in Figure 30. Activities that developed body awareness, proprioceptive sensitivity and visual skills development were the most frequently presented for Ernie. The predominant teaching strategies used to support Ernie's participation during the programme were verbal cues, immediate feedback, demonstrations and motivational comments (See Figure 31).

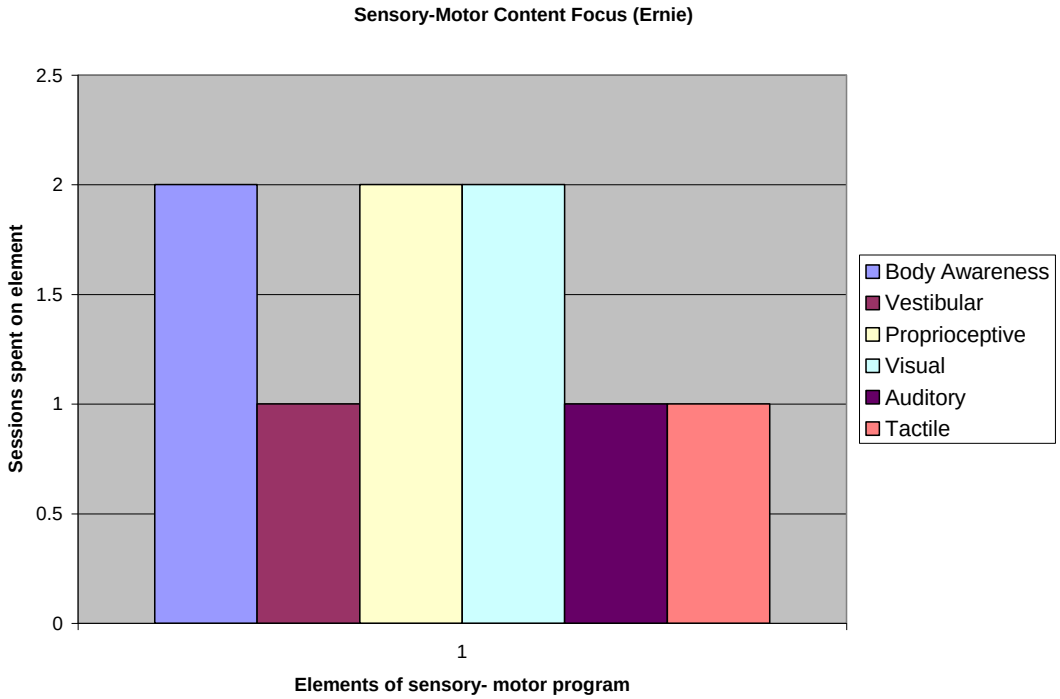

Figure 30

Focus for the development of Ernie's sensory-motor skills

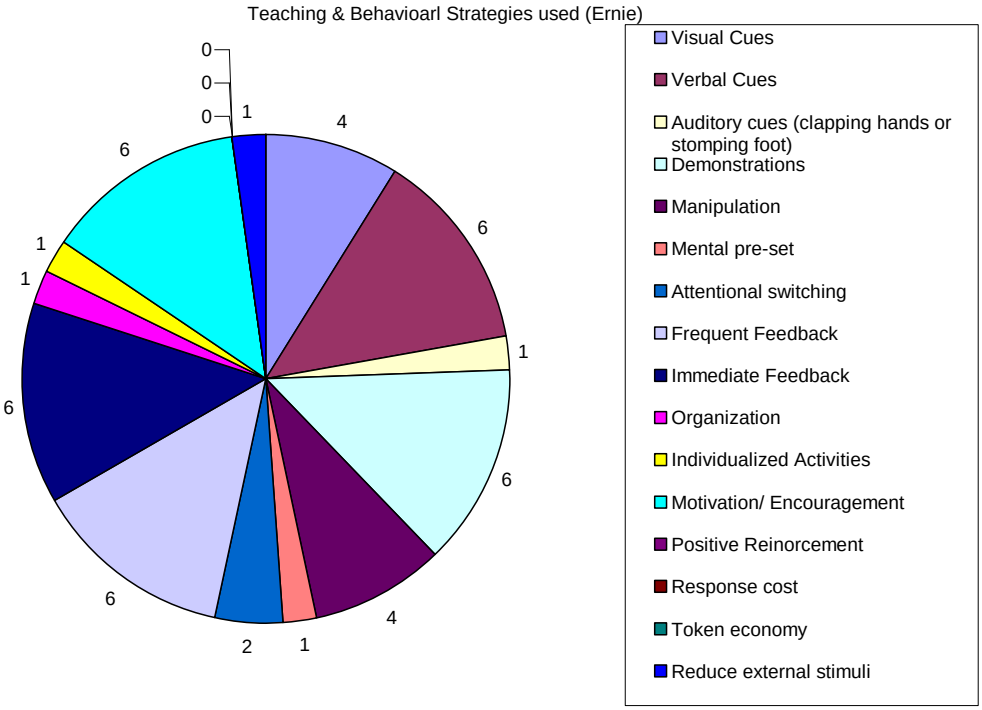

Figure 31

Predominant teaching strategies used during Ernie's sessions

Session One

During the first session of the programme the focus was on developing proprioception and the vestibular system. All exercises on the floor and Swiss ball were focused on testing proprioception and strengthening the core muscles needed for postural control. Ernie was extremely stable in the core and could successfully do most of the activities. The problem was that Ernie tended to do things to quickly in order to do what he wanted or what interested him. This caused him to show signs of poor motor performance. Overall he had a good sense of body awareness but his lack of focused attention had a negative effect on his movement. His inability to keep focused and stay on track caused him to make unnecessary mistakes in conducting body awareness tasks. Instructions had to be repeated a few times during the execution of the task at hand to keep him focused and cues had to be repeated to remind him to finish the task at hand. Instructions had to be repeated again and again. Constant verbal feedback, motivation and repetition were needed to keep Ernie focused during a session.

Homework after session one. After the first session Ernie was asked to practice jumping from tile to tile (in blocks) at home, first double foot and then one-legged hops. He was also asked to practice jumping from the ground onto a step and running up and down on step.

Session Two

The focus of the second session was on visual tracking and coordination. The session was conducted outside. Ernie was very aware of other people and ongoing activities in the background. He was very skilled at hand-eye coordination and enjoyed one of the activities so much that he wanted to do it again and again. This was a breakthrough in motivation as this activity was used to keep him motivated. Concurrent feedback, reinforcement and visual cues where needed to keep him on track so that he could successfully finish each task. Without repeating instructions and cues he soon failed to keep on track and start doing his own thing as soon as he lost interest or is not in the mood to take part.

Homework after session two. At the end of this second session he was told to practice his modified juggling skills at home. This entailed two socks being

folded into two little balls and then juggling with these “balls.” He was told he could practice with tennis balls if he felt confident. He also had to practice the one handed throwing against a wall or with a friend or family member.

Session Three

The third session focused on body awareness and memory sequencing. Ernie showed good body awareness capabilities. At the end of the session Ernie was asked to conduct some of the activities and instructions while standing on the bosu ball. He enjoyed this activity because it was challenging to him and immediately he also showed more focus in what he was doing. A reward system was implemented for him, with the ball and bucket game as reward at the end of each session if he completed the session without moaning about activities or refusing to do some of the activities. This was very successful as it helped to get through the program each session and he enjoyed something positive in the end.

Homework after session three. At the end of this session Ernie reported that he did practice the previous weeks’ homework. Ernie was encouraged to practice his hops from block to block and step-to-step again.

Session Four

Fourth session focus was based on “time-on-task” activities and mental set by means of verbal cueing. Each activity was first described to Ernie and then he was asked to repeat the instructions and then describe how he would go about executing the task. This mental set and step-by-step verbal rehearsal helped Ernie to be more focused and not rush through the activity. During the execution phase he was asked to describe what he was doing step-by-step. The session leader had to be very strict to keep him on task, not allowing him to go faster than necessary and ensuring that he completed each task to his potential. . This helped him stay focused and not rush everything.

Homework after session four. Ernie received no homework after this session but was asked to try and practice a previous session’s modified juggling activity.

Session Five

The fifth session used various colours, shapes and sizes. Colours varied from blue, green, yellow, red and orange. The shapes of the targets varied from a target hoop on the wall to a bucket or hoop on the floor, as well cones and beacons. Sizes of the targets varied. Targets were small hoops, large hoops, buckets or beacons. Throwing equipment varied from beanbags to tennis balls, different colour softballs and handballs. Target games where the main game, challenging aiming, distractibility and focus in every possible way. Attentional focus was on distractibility and focus among different cues and the sensory-motor focus was on the visual system, as well as the proprioceptive system to a lesser degree (See Figure 29 & 30). Ernie enjoyed all the activities and seemed very skilled at all the aiming and throwing activities. He showed more skill when aiming at targets on a wall, but become less skilled when the distance increased or when beanbags had to be thrown into targets or buckets on the floor. He needed constant encouragement as he easily tired and tended to give up on the task as soon as he did not manage to successfully complete it. He overcorrected on tasks each time and struggled with force control. Concurrent feedback and encouragement was needed to keep Ernie motivated and on track. Teaching and behavioural strategies (See Figure 31) during the session stressed eye contact and demonstration, refocusing and verbal cueing as well as a lot of motivation to keep him on track.

Homework after session five. Ernie was instructed to use all possible items he could at home that he could use to practice throwing into buckets, wash baskets, etc.

Session Six

Ernie enjoyed the sixth session a lot, perhaps because it included a combination of all the activities from previous sessions to reward him for his participation. Some of the teaching and behavioural strategies used were constant feedback and reinforcement to keep him on track. Verbal cues and feedback were needed throughout to keep him on track and ensure that he did not get too carried away with his own thing.

Post-programme Assessment

The BOTMP was administered immediately after the conclusion of the intervention programme during the 10th week of the study. The parents and the teacher were asked to continue to complete the ADHDT for weeks 11 and 12 in order to determine if the programme had any impact on Ernie's behaviour. Changes in motor proficiency were tracked by comparing the baseline results with the pre-test and post-test results. Changes in the ADHDT results were tracked first by drawing a chart of the changes in hyperactivity, impulsivity and inattention. Then, comparison of changes in the soft signs in each category were tracked by comparing week one reports (baseline) with week 5 (pre-test) and week 12 (post-test) results.

Changes in Ernie's Motor Proficiency

During post-testing Ernie was calmer and focused and he did not ask as many unnecessary questions as during the post-test. He was more cooperative and waited for instructions to be completed before he began with an activity. This may be a sign of Ernie's confidence improving. He seemed to grow more confident in his capabilities as well as feeling comfortable with the testing process and programme leader. His teacher pointed out that he was often a bit uncomfortable around new people and in unfamiliar situations. He showed good improvement on the subtests of balance and manual dexterity. There were minor improvements on some of the other subtests as well. Ernie's total score on the BOTMP short form test improved to a 75 score out of a possible 85.

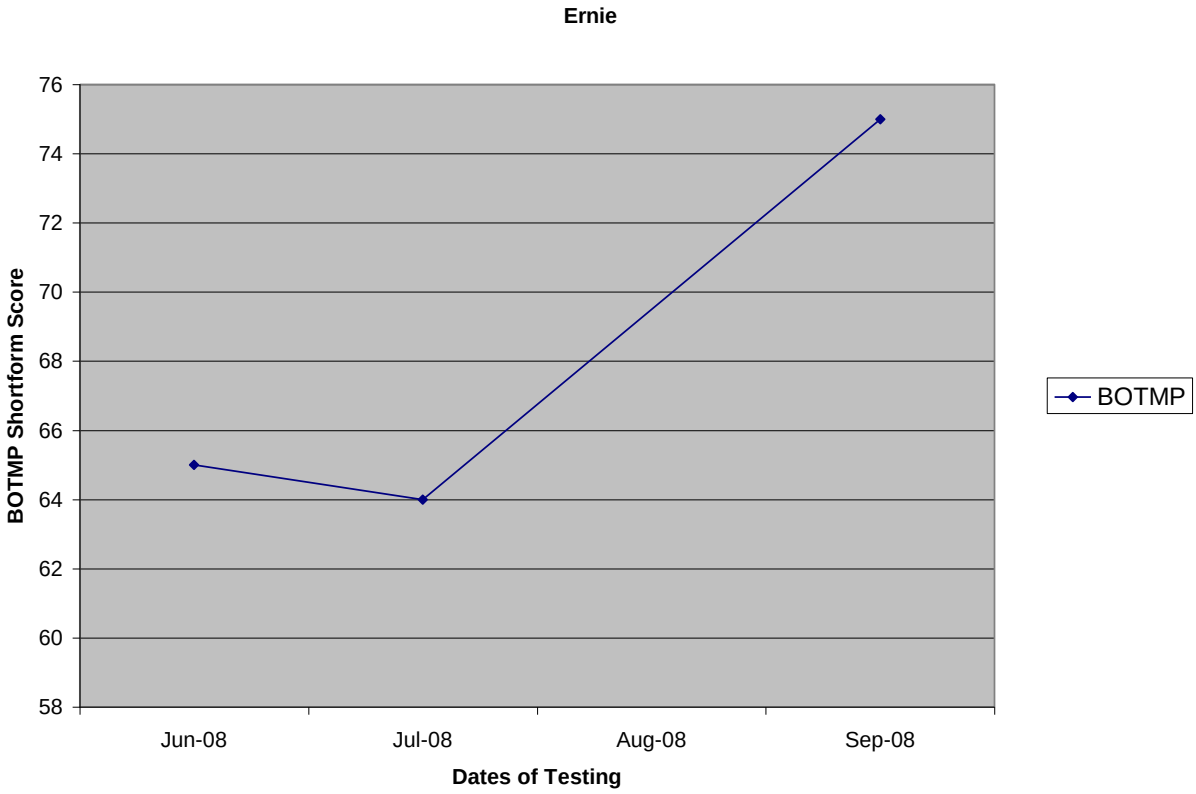

Figure 32

Changes in BOTMP result for Ernie

Ernie's results for the baseline, pre- and post-test on the BOTMP Short form were made up out of 8 variables (See Figure 33).

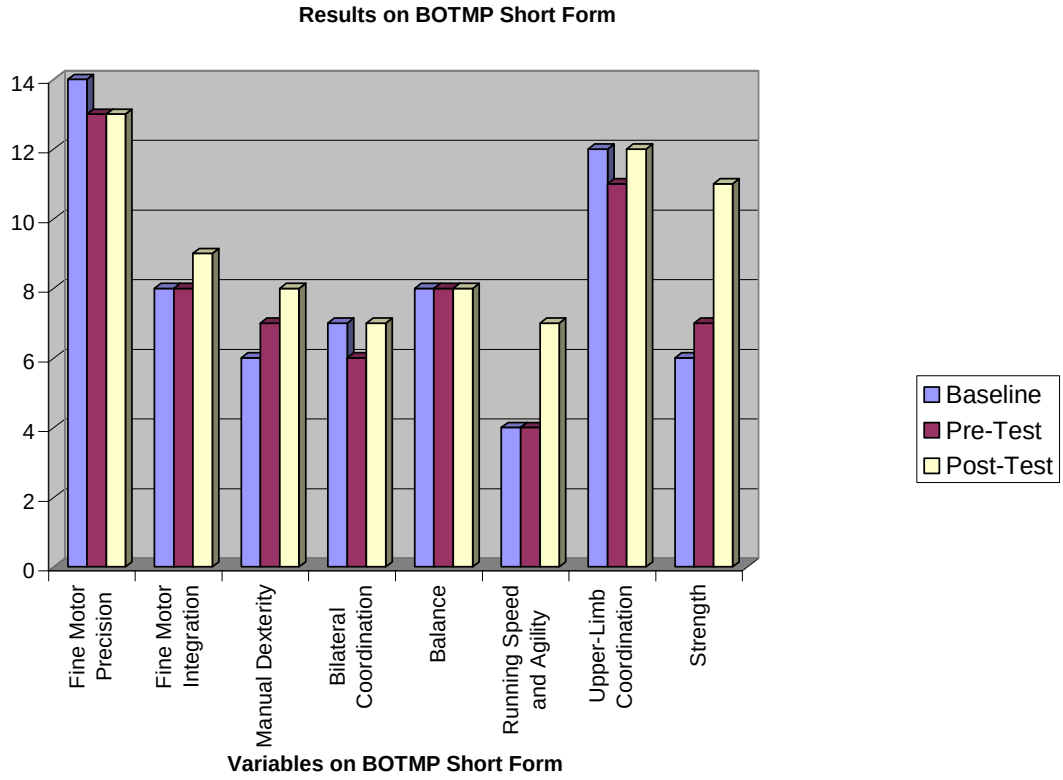

Figure 33

Changes in BOTMP according to each of 8 variables

1. Fine Motor Precision

On the baseline test Ernie faired well on the drawing lines through paths tasks as well as on the folding paper task. During pre-testing he scored maximum points drawing lines through paths and scored 6 out of a possible 7 for the paper folding task. His results for drawing lines through paths and folding paper stayed the same for the post-test.

2. Fine Motor Integration

Ernie was able to copy both the square and star with maximal results and scored 4 out of a possible 5 points for both of the tasks at hand on the baseline effort. During pre-testing his ability to copy the shapes stayed the same for both efforts and he again scored 4 points on each of the tasks. During post-testing Ernie was able to copy the star with great success but still could not achieve all the points on the square copying task, he did however score 4 out of five for copying the square on the post-test. Mistakes may have cost him his 1 point on each of the attempts as he was too hasty.

3. Manual Dexterity

On the baseline test Ernie was only able to transfer between 13 and 14 pennies during the 15 seconds and scored 6 points on the test. During pre-testing he improved slightly on the test being able to transfer between 15 and 16 pennies and scoring a total of 7 points and on the post-test he was able to score 8 points by transferring between 17 and 18 pennies during the 15 seconds of the task. He achieved this by self-motivation and setting a goal for himself at the start of this test.

4. Bilateral Coordination

On the baseline attempt Ernie showed great skill in both attempts and scored maximum score on both tasks. During pre-testing Ernie was able to achieve a maximum score on the jumping task but was only able to score 3 points on the tapping task; only being able to achieve between 5 and 9 successful taps. During post-testing he was again able to achieve maximum scores in both the tasks at hand. He did improve on the jumping task and not only scored a maximum on the tapping score but also on the jumping task. He scored 3 points on the jumping task which means he was able to perform 5 synchronized jumps and 4 points on the tapping task as he was able to perform 10 synchronized taps during the task.

5. Balance

During baseline, pre- and post-testing Ernie was able to score the maximum amount of points on the task testing his ability to walk forward on a line. He showed no difficulty with his ability to balance on one leg on a balance beam for 10 seconds with his eyes open. During baseline testing he was able to balance for 10 seconds on the beam, scoring 4 points on the task. During pre-testing and post-testing he again showed great skill and again scored the maximum amount of points on the task.

6. Running Speed and Agility

During baseline testing Ernie was only able to do between 10 and 14 correct hops, earning himself 4 points of the task. During pre-testing he was again only able to do between 10 and 14 successful hops, earning him 4 points on the test and during post-testing he improved quite a lot from the pre-test and was able to do between 25 and 29 hops as on baseline testing, scoring 7 points on the task.

7. Upper-Limb Coordination

During baseline testing Ernie was able to perform 5 successful dropping and catch actions and between 10 dribbling actions on the tests. He scored 5 points on the drop and catch task and 7 points on the dribbling task during baseline testing. During pre-testing he was able to perform 5 successful dropping and catch actions and between 8 and 9 dribbling actions on the task, earning him 5 and 6 points respectively. On the post-test he showed improvement, being able to drop and catch the ball with great success and dribbling the ball; scoring a maximum of 5 points on the drop and catch and 7 on the dribbling task.

8. Strength

During baseline testing it was found that Ernie could only perform between 6 and 10 successful sit-ups and push-ups during the 30 seconds. During pre-testing his score on the sit-ups improved and he was able to score 4 points on the task, performing between 11 and 15 sit-ups. His score on the push-up test stated the same as on baseline testing. During post-testing his score on the push-up task improved to a score of between 21 and 25 and he scored 6 points on the push-up

task. His sit-up score also improved to between 16 and 20 sit-ups, and he was able to score 5 points on the task.

Changes in Ernie's ADHDT Results

Changes in ADHDT results by the parent cannot be reported because the parent never submitted the results at the end of the study. Special efforts were made to contact the mother, but there was no reply. After a few more attempts the mother did inform the researcher that they were moving and the envelope with the completed ADHDT forms had been misplaced and were never found.

The ADHDT results by the teacher at the end of the study showed a huge improvement in the category of impulsivity, but deterioration in hyperactivity and inattention. Although some of the soft signs of inattentiveness did not disappear they did seem to improve over time (See Figures 34).

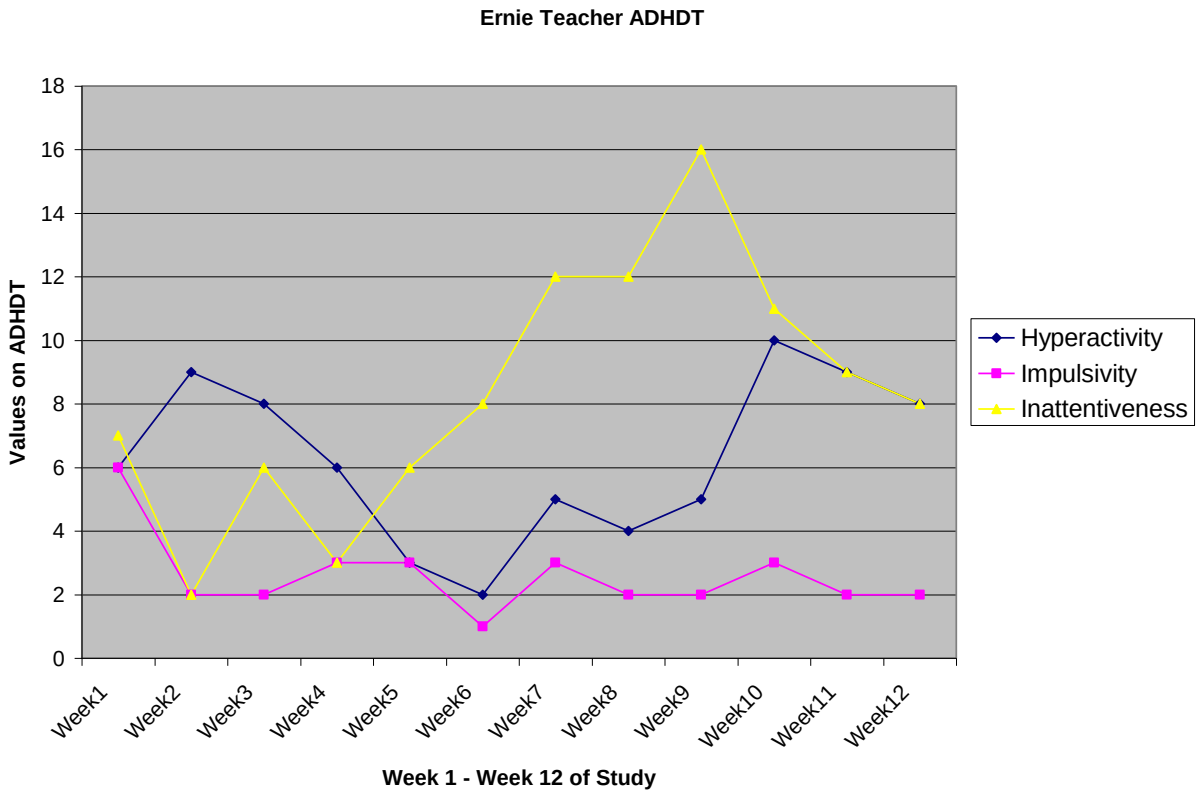

Figure 34

ADHDT results submitted by Ernie's teacher over 12 weeks

Differences in Perceptions of Ernie's Hyperactivity

Differences in the levels of Ernie's hyperactivity are reported to each of the items on the ADHDT sub-scale. These are evident when looking at Figure 35.

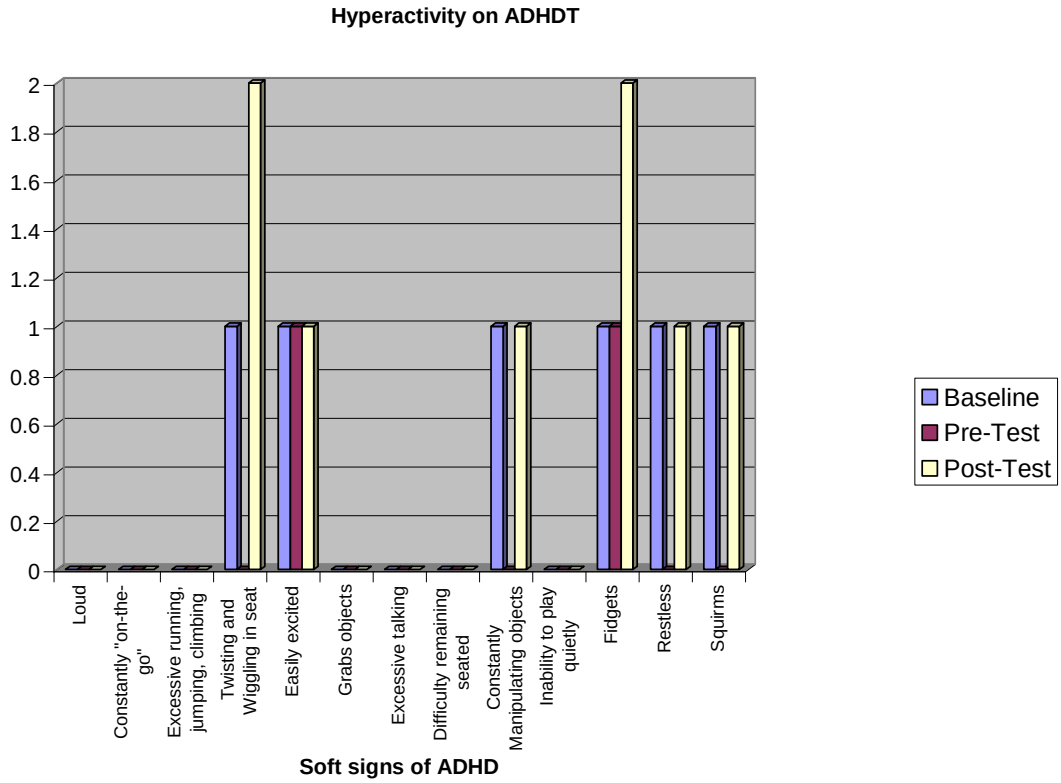

Figure 35

Soft signs of hyperactivity reported by Ernie's teacher

Ernie's teacher reported great fluctuations in the soft signs of hyperactivity on Ernie. At the beginning of the programme during baseline testing she stated that Ernie was constantly wiggling and twisting in his seat, manipulating objects, fidgeting, being restless and squirms, as well as being easily excited are all mild problems in his case.

As many as four of these elements had changed by the time of the pre-test and did not pose a problem anymore. These soft signs were twisting and wiggling, constantly manipulating objects, restlessness and squirming.

By the end of the program these soft signs all appeared again and posed a mild problem during daily functioning. The teacher however found that twisting and wiggling became a severe problem along with fidgeting.

Differences in the Perceptions of Ernie's Impulsivity

Differences in the teachers' perception of Ernie's impulsivity are evident in figure 36.

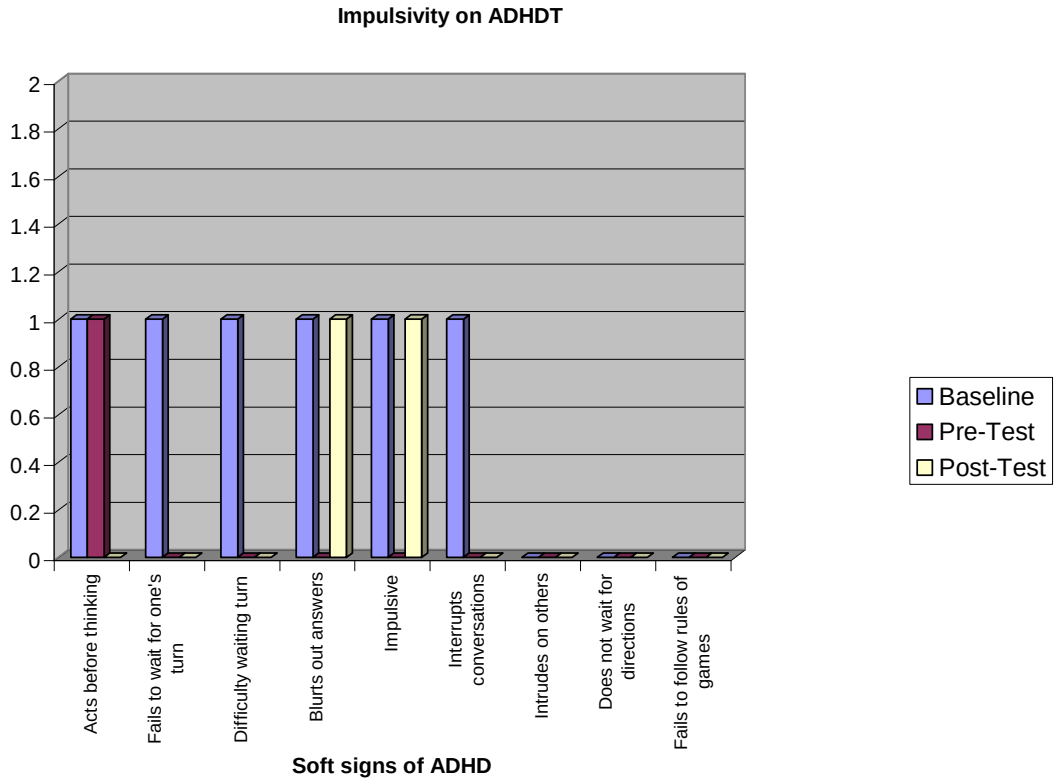

Figure 36

Soft signs of impulsivity reported by Ernie's teacher

Ernie's teacher reported that she experienced a few mild problems with some of the soft signs of impulsivity when it came to Ernie during the baseline assessment period. These soft signs included acting before thinking, fails to take

turns or waiting for his turn. Ernie is also very impulsive, interrupting conversations and blurting out answers. By the time pre-testing was done all of these but acting before thinking had disappeared as posing problems. By the end of the programme the teacher stated that there were again some mild soft signs of impulsivity. Ernie again showed impulsive behaviours and had a way of blurting out answers.

Differences in the Perceptions of Ernie's Inattention

Differences in the teachers' perception of Ernie's inattention are evident in figure 37.

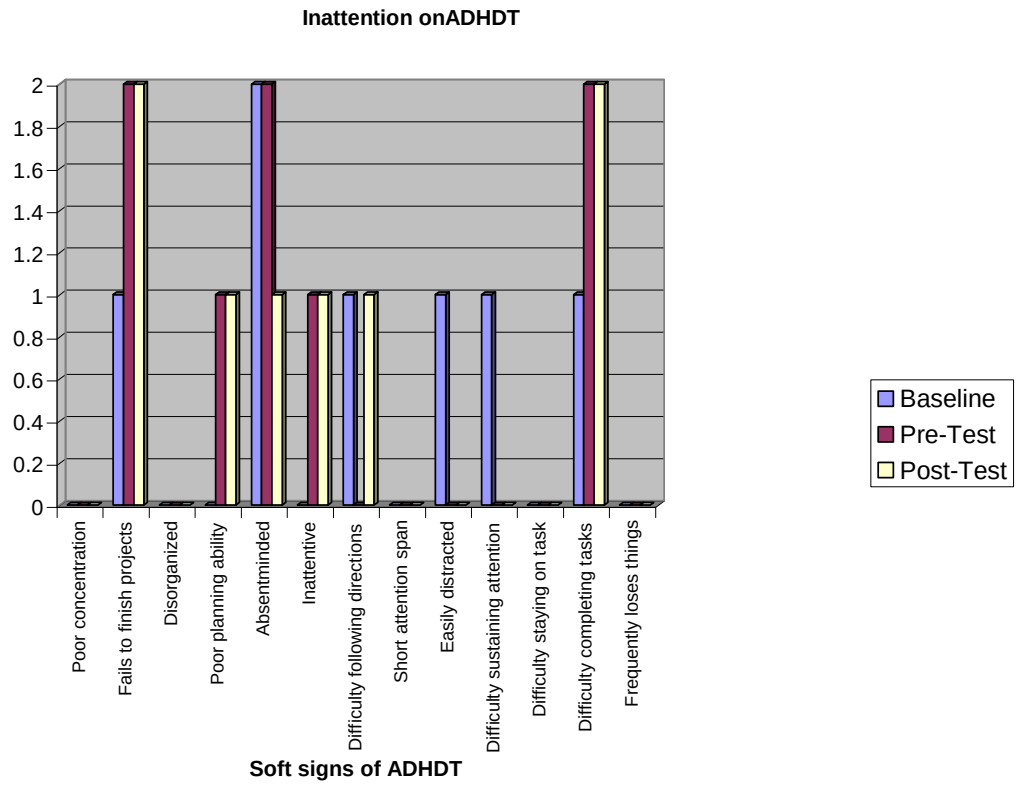

Figure 37

Soft signs of inattention reported by Ernie's teacher

Ernie's teacher reported that she experienced a few mild problems with some of the soft signs of inattention when evaluating Ernie's behaviour during the

baseline assessment period. These soft signs included: failing to finish projects, having difficulty following directions, difficulty sustaining attention and completing tasks. Ernie being very absentminded caused severe problems according to the teacher.

By the time pre-testing was done some of these soft signs had become severe problems according to the teacher. She found Ernie being unable to finish projects, being very absentminded and having difficulty completing tasks as being severe problems in the classroom life of Ernie. By this time some of the soft signs were no longer a mild problem, but some of the signs that were not a problem during baseline testing seemed to cause mild concern. These were inattention and poor planning abilities.

Some deterioration did however set in during the program and by the end of the programme the teacher stated that there were severe problems when it came to Ernie's ability to finish projects and he was finding it very difficult to complete tasks.

Discussion

Ernie showed a huge improvement in terms of his motor proficiency (Figure 32). He made substantial progress and seemed to be a different child from the beginning of the programme. In the beginning Ernie was not very enthusiastic and could not finish each session fast enough. Towards the end of the programme he was very excited to take part in all the activities, especially as soon as he realised he was good at it. As soon as he felt more capable he also became more confident and was more eager to try new and exciting things.

Michel *et al.* (2005) examined the effects of positive reinforcement on children struggling with signs of ADHD. In the study they found that children in the ADHD group showed the greatest benefit from reinforcement, suggesting reward accounted for a substantial amount of variation in inhibition. There was also evidence that highly motivating consequences (compared to a task with less motivating consequences) significantly improved response inhibition in children with ADHD. These results supported that the notion of immediate reinforcement

improves the performance of the children with ADHD. The authors also suggested suggestion that reinforcement may have the potential to change the underlying mechanisms controlling behaviour in children ADHD. It was very clear that immediate feedback played a very important role in Ernie's motivation and performance. As soon as he received feedback and positive reinforcement during difficult tasks he was more motivated and energized to try the activity again, without asking when the session would finish or when he could move on to the next activity.

In a study completed by Harvey and Reid (1997) the fundamental gross motor skills and fitness conditions of children with ADHD were described. The study found that fundamental gross motor performance and physical fitness of children with ADHD were substantially below average. Ernie did show signs of lower motor proficiency with initial testing. He did however show improvement in motor proficiency over time, which supports showed the value of participation in a gross motor skill programme on improving children's motor proficiency. Tirosh (2006) *et al.* also mentioned that children who suffer from ADHD could show signs of motor deficiencies that should be addressed at an early age to prevent these deficiencies from holding these children back in later life.

Beyer (1999) determined that differences in the motor proficiency scores of children could influence taking different approaches for addressing the physical education movement needs of boys with ADHD and boys with Learning Disabilities. In tasks of bilateral coordination, strength, visual-motor control and upper limb speed and dexterity, boys with LD performed significantly better than boys with ADHD. The poorer performance by children with ADHD supports research findings that performance in fine motor and timed tasks of motor coordination is significantly inferior in participants with ADHD when compared to controls without disabilities. In Ernie's case some of the alternative approaches were to use immediate feedback and positive reinforcement as a tool to refocus and encourage his participation on tasks to help him improve. As soon as he was focused and motivated it bettered the results of his training ability and therefore the performance ability.

Ernie did benefit from his participation in the Purposeful Play programme that combined a sensory-motor program with an attentional skills development programme. Not only did his participation improve aspects of his attentional control and movement proficiency but it also seemed to have a especially for the psychological benefit for Ernie. His need for motivation and encouragement may be the key to his future development. He showed signs of improvement in his abilities to attend and focus on tasks when the environment is fairly simple. The key to success when working with Ernie was positive reinforcement, encouragement and motivation.

Chapter Seven

Results and Discussion- Case Study Four

The children who volunteered to participate in this study attend a school that was established for children with special educational needs associated with the signs of ADHD. The names used in reporting the results of this research are not the actual names of the children who participated. Information about the lessons presented is included in separate Appendices for each child.

Greg

Greg was a very loud and easily excited 12 year old Grade 5 boy. He was of average height and slightly over-weight for a boy of his age. However, he was constantly on-the-go and very inquisitive. Greg was a very cooperative child who liked to entertained and be the centre of attention. He sought constant attention and affirmation that he is seen and heard.

Baseline Assessment

Baseline assessment was completed during the four weeks prior to the beginning of the six-week intervention programme.

Observation

There were only four children in his Grade 5 class. Greg was constantly on the go in class and found it very difficult staying seated and waiting turns. He often interrupted other students. He would do anything not to stay seated in the classroom and the teacher had to constantly remind him to sit down and finish his work and not to interrupt the students around him. He had a lot of gadgets on his desk which he constantly manipulated including a metal/plastic spoon on which he chewed or played with in his mouth.

On the day of observation at the school Greg seemed to interact well with fellow students. He was very involved in all the games and activities at break time and was often in charge of what was going on. He enjoyed movement and was

very proud when taking part in these activities. Most of the time he and friends would be playing some sort of game like cricket or touchies of some sort or any type of ball game.

Greg was constantly “on-the-go”, twisting, wiggling, fidgeting, and squirming in his seat. He would act before he thinks, fails to wait his turn, blurts out answers, be very impulsive, interrupt conversations and constantly seek conversation. He showed signs of poor concentration, failed to finish projects, had poor planning ability, was very inattentive, and had difficulty following directions. He had a very short attention span, was easily distracted and found it difficult sustaining attention, staying on task and completing tasks.

Greg’s ADHDT Results

Greg’s parents reported that Greg had many of the behavioural characteristics listed in the ADHDT (See Table 8).

At home and in environments other than school, Greg’s parent noted that Greg showed mild problems in the ADHDT category of hyperactivity with behaviours like twisting and wiggling when seated, being easily excited, constantly manipulating objects, fidgeting, squirming and generally being restless and finds it difficult to play quietly. They experienced severe problems with Greg being very loud and doing excessive talking.

His parents found extreme problems with impulsivity on the ADHDT. Greg acted before thinking and was very impulsive, interrupting conversations. He found it very difficult to wait his turn and blurted out answers. He tended to intrude on others, did not wait for directions and failed to follow the rules of games.

He struggled with poor concentration, had poor planning abilities and failed to finish projects. Greg was very inattentive, had a short attention span, was easily distracted and showed extreme problems staying on task, completing tasks and sustaining attention. Some of the more manageable aspects of his behaviour were his absentmindedness and ability to follow directions, although he was also fairly disorganized.

Table 8

Soft signs of behavioural problems for Greg experienced by parent

Category on ADHDT	Soft Signs on ADHDT
Hyperactivity	Loud Constantly on-the-go Twists and Wiggles Easily excited Excessive talking Difficulty remaining seated Constantly manipulating objects Inability to play quietly Fidgets Restless Squirms
Impulsivity	Acts before thinking Fails to wait one's turn Difficulty waiting one's turn Blurts out answers Impulsive Interrupts conversations Intrudes on others Does not wait for directions Fails to follow rules of games
Inattentiveness	Poor concentration Fails to finish projects Disorganized Poor planning ability Absentminded Inattentive Difficulty following directions Short attention span Easily distracted Difficulty sustaining attention Difficulty staying on task Difficulty completing tasks Frequently loses things

Greg showed many of the soft signs found on the ADHDT according to his teacher (See Table 9). She reported that Greg was very loud, excessive talked and was constantly on-the-go, twisting and wiggling in his seat and found it very difficult to stay seated. He was also easily excited. He grabbed objects and was constantly manipulating objects. Greg was restless, unable to play quietly and fidgeted and squirmed, all of which are signs of hyperactivity. The teacher found that Greg was extremely impulsive and failed to wait his turn; take turns, and that

he would blurt out answers. He interrupted conversations, intruded on others and failed to wait for directions or follow the rules of games. This caused a lot of upsets in class because Greg and one of his fellow classmates tended to get on one another's nerves.

Greg showed many of the signs of inattention on the ADHDT. He was easily distracted, had a short attention span, difficulty sustaining attention and showed very poor concentration. He was disorganized, failed to finish projects, had difficulty staying on task and finishing tasks. He tended to be very absentminded, inattentive and tended to lose things.

Table 9

Soft signs of behavioural problems reported by Greg's teacher

Category on ADHDT	Soft Signs on ADHDT
Hyperactivity	Loud Constantly on-the-go Twists and Wiggles Easily excited Excessive talking Difficulty remaining seated Constantly manipulating objects Inability to play quietly Fidgets Restless Squirms
Impulsivity	Acts before thinking Fails to wait one's turn Difficulty waiting one's turn Blurts out answers Impulsive Interrupts conversations Intrudes on others Does not wait for directions Fails to follow rules of games
Inattentiveness	Poor concentration Fails to finish projects Disorganized Poor planning ability Absentminded Inattentive Difficulty following directions Short attention span Easily distracted Difficulty sustaining attention Difficulty staying on task Difficulty completing tasks Frequently loses things

Greg's Motor Proficiency

Baseline testing on the BOTMP was completed four weeks prior to the beginning of the intervention programme. Greg scored 55 out of a possible 85 on the test. His scores were particularly weak on the variables of:

Bilateral coordination

One leg balance

Agility

Strength

Intervention Programme

BOTMP Pre-Test

On the day of the Pre-test Greg was very positive and cooperative, perhaps because he enjoys trying new things. He was very impulsive and acted before instructions have been given. The results of this second administration of the BOTMP found that Greg's scores were low on the following variables:

Balance

Agility

Strength

Greg seemed uncoordinated at times but refused to give up on activities and kept on trying and trying. Sometimes this became a problem because it was necessary to stop him, get him to refocus and try and show him the right way of doing the skill or activity. Greg did get apprehensive at times and told the programme leader to "hang on" and that he would get it right in a minute. He tended to want to finish some of the activities as quickly as possible, no matter what the outcome might be. He had to be encouraged to focus on the outcomes of each specific task and told to focus on, for example, accuracy. His motor proficiency quickly deteriorated whenever the elements of speed or excitement were introduced. Greg scored an overall score of 65 out of a possible 85 on the BOTMP.

Purposeful Play Sessions

The intervention programme for Greg began the first week in August and was conducted every Tuesday for six weeks. His 30-minute session was usually at 13:000. A review of the lesson plans documented the overall programme focus in terms of the development of his attentional skills (see Figure 38). "Controlling distractibility" was the most common lesson focus, followed by "controlling time-on-task" and "discriminating among cues effectively."

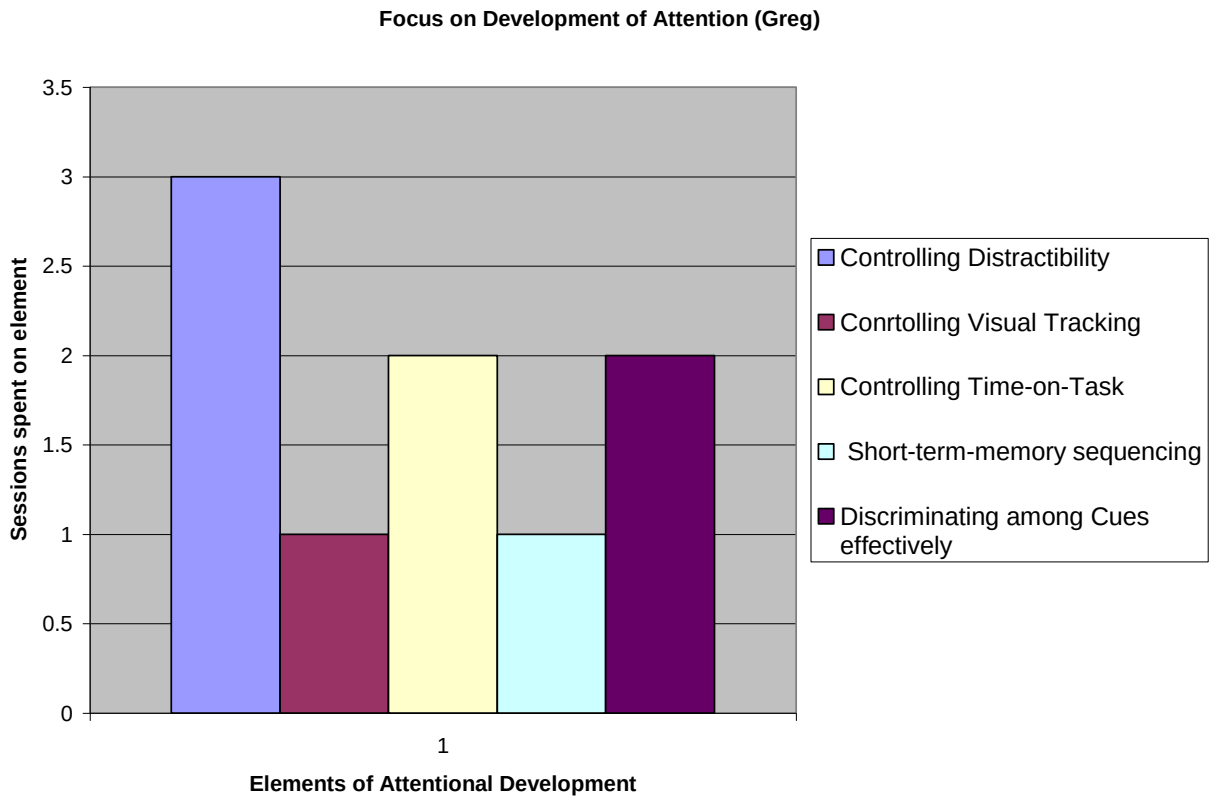

Figure 38

Focus for the development of Greg's attentional skills

The overall programme focus on sensory-motor content is reported in Figure 39. Activities that developed body awareness, proprioceptive sensitivity and visual skills development were the most frequently presented for Greg. The

predominant teaching strategies used to support Greg's participation during the programme were verbal cues, immediate feedback, demonstrations and motivational comments (See Figure 40).

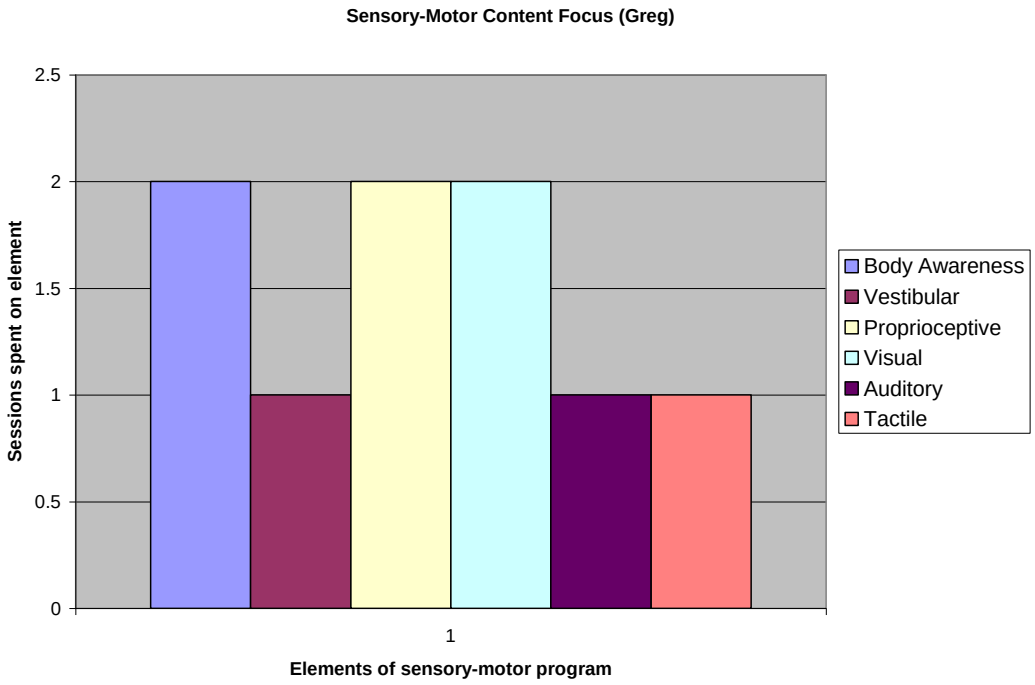

Figure 39

Focus for the development of Greg's sensory-motor skills

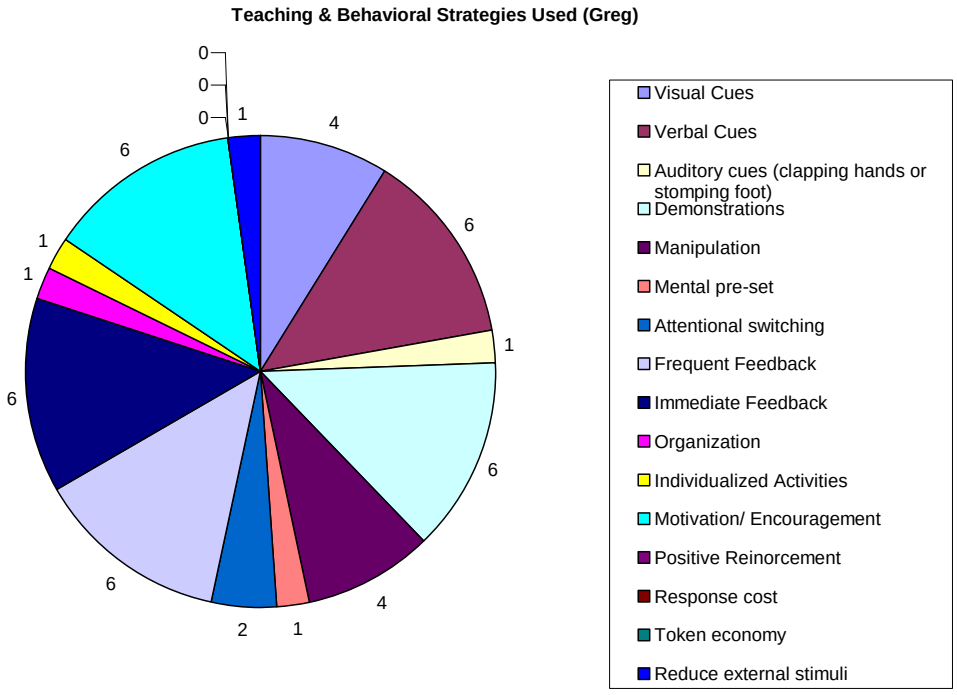

Figure 40

Predominant teaching strategies used during Greg's sessions

Session One

During the first session of the programme the focus was on developing proprioception and the vestibular system. All exercises on the floor and Swiss ball were focused on testing proprioception and strengthening the core muscles needed for postural control. Greg was extremely unstable in the core and struggled to complete most of the activities. He tended to give up very quickly if the activity was a bit tiring of if he found it a bit boring. Overall he had a good sense of body awareness but his lack of focused attention influenced effective movement. His inability to keep focused and stay on track caused him to make unnecessary mistakes in conducting body awareness tasks. Instructions had to be repeated a few times during the execution of the task to keep him focused and verbal cues had to be repeated to remind him to finish the task. Some of the teaching and behavioural strategies used were verbal feedback, motivation and repetition. It seemed as though talking Greg him through the whole session was

the only effective way to keep him from quitting as soon as he became tired or if he struggled to achieve success.

Homework after session one. After the first session Greg was asked to practice the “bridge” formation on the floor at home, a core stabilizing exercise and he had to practice jumping from tile to tile (in blocks) at home, first double foot and then one-legged hops.

Session Two

The focus of the second session was on visual tracking and coordination (see Appendix D for lesson sample). The session was conducted outside. He was very aware of other people and ongoing activities in the background. Although Greg sought constant attention and tended to be very loud, he was very self-conscious when doing activities when he knew that there might be passers-by. Greg was good at manipulating different objects and equipment but tended to try to do activities too quickly and then the “skill fell apart.” Greg was encouraged to take more time on each task to complete it with more control. He was very skilled at foot-eye coordination tasks and tended to get carried away with any activity that he enjoys. Some of the teaching and behavioural strategies (See Figure 40) were: concurrent feedback, reinforcement and visual cues to keep him on track and allowing him to successfully stay on track and finish each task. Without repeating instructions and cues he soon failed to keep on track. He started doing his own thing as soon as he lost interest or was not in the mood to take part.

Homework after session two. At the beginning of the session Greg proudly reported that he did the previous week’s homework. He then demonstrated how his strength had improved, which included lifting up his shirt to show his abdominal-muscles. At the end of this second session, Greg was very excited to go home and practice his juggling skills and one-handed throwing and catching with a tennis ball.

Session Three

The third session focused on body awareness and memory sequencing (See Figure 38 & 39). Greg showed good body awareness capabilities and

concepts. At the end of the session Greg was asked to conduct some of the activities and instructions while standing on the bozu ball. He enjoyed this activity because it was challenging to him and immediately he also showed more focus in what he was doing.

Some of the most valuable teaching and behavioural strategies (See Figure 40) during this session were verbal cueing, frequent feedback, repetition and encouragement.

Homework after session three. At the end of this session Greg revealed that he did not practice the previous weeks' homework that often. During the session he did reveal that they played similar memory games at home and he was encouraged to do that as often as possible till the next session.

Session Four

The fourth session focus was on "time-on-task" activities and mental set by means of verbal cueing. The attentional development focus was on time-on-task and sensory-motor focus was on auditory system development (See Figure 38 & 39). Each activity and the means by which it should be conducted were described to Greg, and then he was asked to repeat the instructions and tell the session leader how he would go about executing the task. This mental set and step-by-step rehearsal helped Greg to be more focused and not rush through each session. During execution he was asked to tell the session leader step-by-step what he was doing and what would happen next. The session leader had to be very strict to keep him on track with what he was busy, not allowing him once to go faster than necessary or get side-tracked and ensure that he completed the task to the utmost. This helped him a lot staying on track and not to rush everything. Some of the teaching and behavioural strategies (See Figure 40) used in this session were frequent feedback and encouragement.

Homework after session four. No homework was given after this session.

Session Five

The fifth session included various colours, shapes and sizes. Colours varied from blue, green, yellow, red and orange. The shapes of the targets varied from a target hoop on the wall to a bucket or hoop on the floor, as well cones and beacons. Sizes of the targets and the equipment varied. Targets were small hoops, large hoops, buckets and beacons. Throwing equipment varied from beanbags to tennis balls to different colour softballs and handballs. Target games where the main type of game, challenging aiming, distractibility and focus in every possible way.

Attentional focus was on distractibility and focus among different cues and the sensory-motor focus was on the visual system, as well as the proprioceptive system to a lesser degree (See Figure 38 & 39). Greg enjoyed participation and seemed very skilled at all the aiming and throwing activities. He showed more skill when aiming at targets on a wall, but became less accurate when the distance of the activity increased or when beanbags had to be thrown into targets or buckets on the floor. He needed constant encouragement because he easily tired and tended to give up on the task as soon as he did not manage to successfully complete it. At times he had to be stopped and refocused because he started doing tasks too fast and his performance would deteriorate. He overcorrected on tasks each time and struggled with force control. Concurrent feedback and encouragement was needed to keep Greg motivated and on task.

Homework after session five. No “homework” was given after this session.

Session Six

During the sixth session the focus was on a combination of all the activities from previous sessions with which he had been successful to reward him for his participation. Constant feedback and reassurance was needed to keep him on task. Verbal cues and feedback was needed throughout to ensure that he did not get too carried away with “his own thing.” He appeared to thrive on encouragement.

Post-programme assessment

The BOTMP was administered immediately after the conclusion of the intervention programme during the 10th week of the study. The parents and the teacher were asked to continue to complete the ADHDT for weeks 11 and 12 in order to determine if the programme had any impact on Greg's behaviour. Changes in motor proficiency were tracked by comparing the baseline results with the pre-test and post-test results. Changes in ADHD were tracked first by drawing a graph of the changes in hyperactivity, impulsivity and inattention. Then, comparison of changes in the soft signs in each category were tracked by comparing week one reports (baseline) with week 5 (pre-test) and week 12 (post-test) results.

Changes in Greg's Motor Proficiency

During post-testing Greg was more focused and he did not ask as many questions as during the post-test. He was more cooperative and waited for instructions to be completed before he began with an activity. He showed good improvement on subtests of bilateral coordination, balance and agility. There was not much improvement on strength, but there was not much emphasis placed on strength during the intervention program. Greg's total score on the BOTMP short form test improved to a 71 score out of a possible 85.

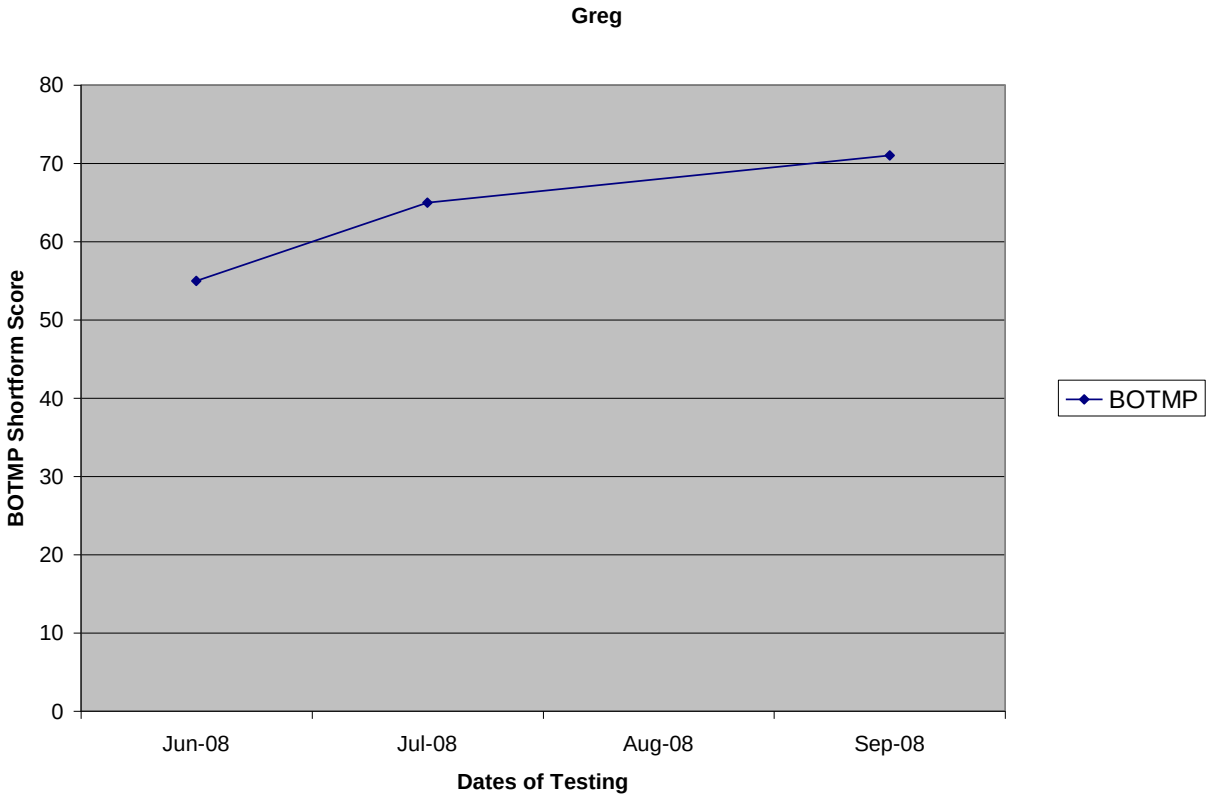

Figure 41

Changes in BOTMP results for Greg

Greg's results for the baseline, pre- and post-test on the BOTMP Short form were made up out of 8 variables (See Figure 42).

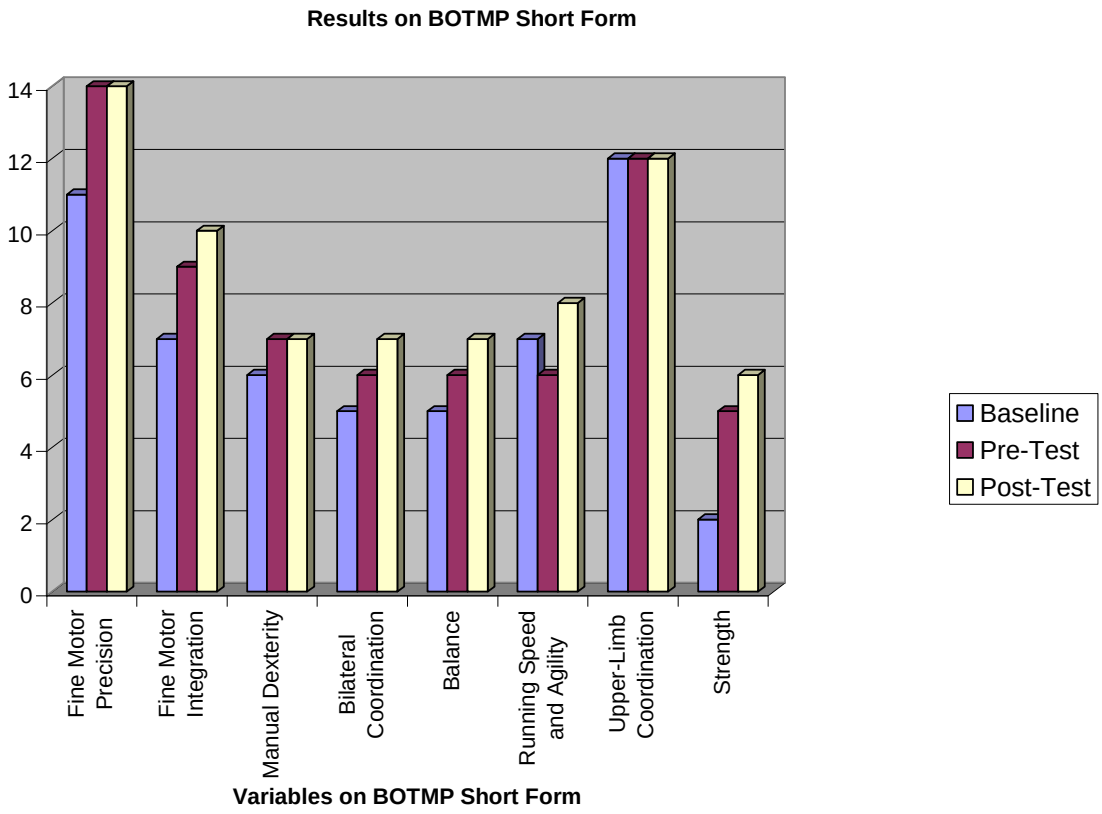

Figure 42

Changes in BOTMP according to each of 8 variables

1. Fine Motor Precision

On the baseline test Greg performed well on the drawing lines through paths tasks as well as on the folding paper task. He scored the maximum amount of points on the drawing lines tasks but was only able to score 4 of the possible 7 points on the folding paper task. During pre-testing he scored maximum points drawing lines through paths and paper folding task. His results for drawing lines through paths and folding paper stayed the same for the post-test

2. Fine Motor Integration

Greg was able to copy both the square and star, scored 4 out of a possible 5 points for copying the square and 3 out of 5 for the star. During pre-testing his ability to copy the shapes improved slightly and he scored 5 out of 5 for copying the square and 4 out of 5 for copying of the star. During post-testing Greg was able to copy both the square and star with great success achieving the maximal amount of points on both the tasks.

3. Manual Dexterity

On the baseline test Greg was only able to transfer between 13 and 14 pennies during the 15 seconds and scored 6 points on the test. During pre-testing he improved slightly on the test being able to transfer between 15 and 16 pennies and scoring a total of 7 points. His score stayed the same for that of his post-test, scoring 7 points out of a possible 9.

4. Bilateral Coordination

On the baseline attempt Greg was able to complete between 2 and 4 successful jumps on the test, earning himself 2 points on this attempt. During the tapping task during baseline testing he was able to complete between 5 and 9 taps and scored 3 points. During pre-testing Greg was able to achieve a maximum score on the tapping task but was only able to score 2 points on the synchronized jumping task; only being able to achieve between 2 and 4 successful jumps. During post-testing he was again able to achieve a maximum score on the synchronized tapping task and improved on the jumping task, scoring a maximum amount of points on both tasks. He scored 3 points on the jumping task which means he was able to perform 5 synchronized jumps and 4 points on the tapping task as he was able to perform 10 synchronized taps during the task.

5. Balance

During baseline, pre- and post-testing Greg was able to score the maximum amount of points on the task testing his ability to walk forward on a line. However, he showed huge difficulty with his ability to balance on one leg on a balance beam

for 10 seconds with his eyes open. During baseline testing he was able to balance for between 1.0 and 2.9 seconds on the beam, scoring 1 point on the task. During pre-testing he improved and was able to balance between 3.0 and 5.9 seconds on the balance beam, scoring 2 points on the task. During post-testing he again showed improvement and was able to balance between 6.0 and 9.9 seconds on the balance beam, scoring 3 points on the task.

6. Running Speed and Agility

During baseline testing Greg was only able to do between 25 and 29 correct hops, earning himself 7 points on the task. During pre-testing he was only able to do between 20 and 24 successful hops, earning him 6 points on the test and during post-testing he improved quite a lot from the pre-test and was able to do between 30 and 39 hops, scoring 8 points on the task.

7. Upper-Limb Coordination

During baseline testing Greg was able to perform 5 successful dropping and catch actions and 10 dribbling actions on the tests. He scored 5 points on the drop and catch task and 7 points on the dribbling task during baseline testing. During pre-and post-testing Greg again showed great success on the tasks and was again able to score the maximum amount of points on each task.

8. Strength

During baseline testing Greg was only able to perform between 3 and 5 successful push-ups during the 30 seconds. He was unable to perform any sit-ups successfully during baseline testing. During pre-testing his score on the sit-ups improved and he was able to score 4 points on the task, performing between 11 and 15 sit-ups. His score on the push-up test deteriorated and he was only able to perform between 1 and 2 correct push-ups, scoring only 1 point on this task during pre-testing. During post-testing his score on the push-up task improved to between 6 and 10 push-ups during the 30 seconds, scoring 3 points on completing the 30 seconds. He was however only able to perform between 6 and 10 sit-ups on the given day and scored only 3 points on the sit-up attempt.

Changes in Greg's ADHDT Results

The ADHDT results by the parent were not received back after the study. The researcher did try to contact Greg's mother several times and eventually reached her by telephone and asked that the envelope containing all the data for ADHDT assessment be sent to the school. The mother promised to deliver the ADHDT results to the school secretary. The researcher enquired about the results several times with the secretary, but no feedback was ever received from the parents.

The ADHDT results by the teacher at the end of the study showed mixed findings. Some of the soft signs on the ADHDT did improve while others became a problem or stayed a problem.

The ADHDT results from the teacher showed an overall improvement on impulsivity and inattention towards the end of the program, while hyperactivity stayed a problem.

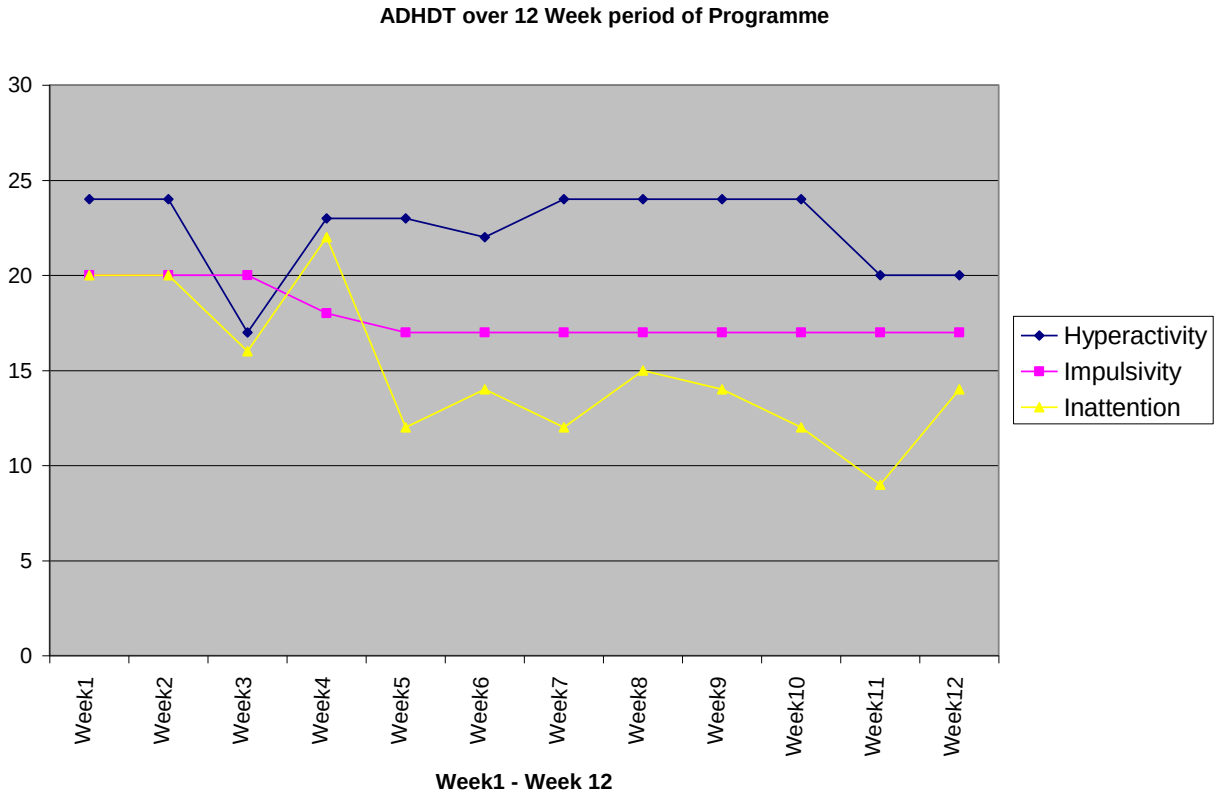

Figure 43

ADHDT results submitted by Greg's teacher over 12 weeks

Differences in Perceptions of Greg's Hyperactivity

Differences in the levels of hyperactivity of Greg are reported to each of the items on the ADHDT sub-scale. These are evident when looking at Figure 44.

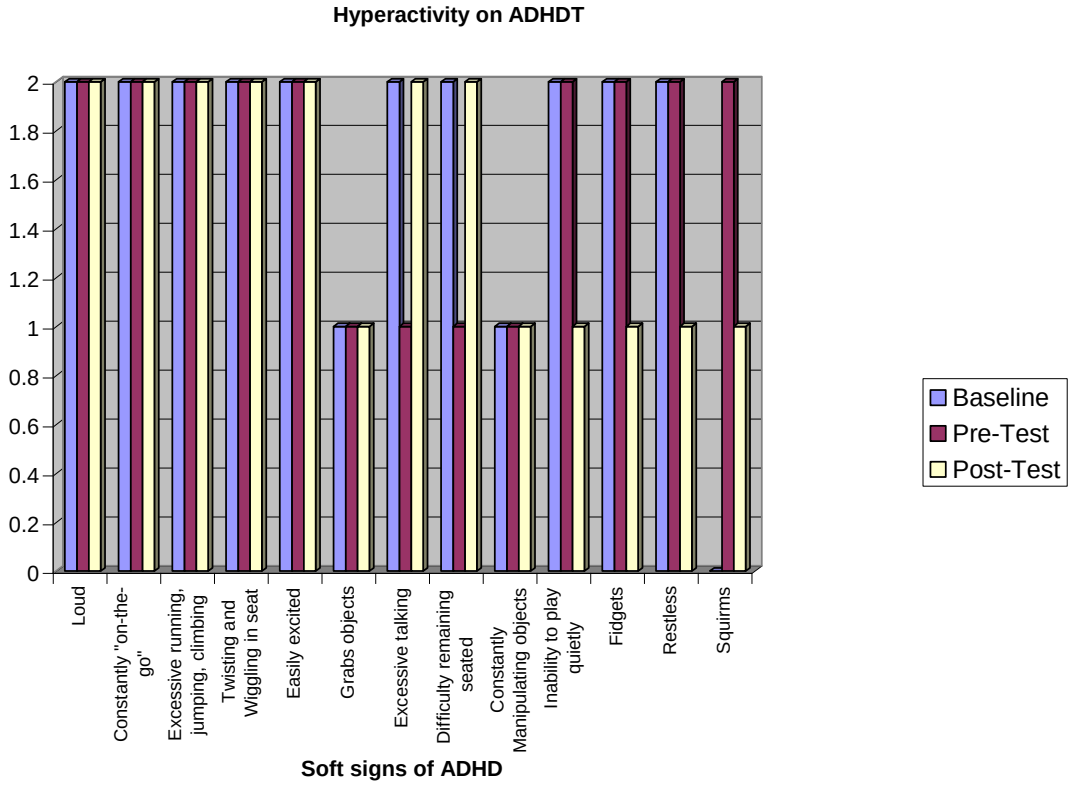

Figure 44

Soft signs of hyperactivity reported by Greg's teacher

Greg's teacher reported severe problems for Greg's in the category of hyperactivity and its severity. At the beginning of the programme during baseline testing she stated that Greg showed severe problems on soft signs like being loud, on the go, excessive movements, twisting and wiggling, excessive talking, inability to play quietly, fidgeting and restlessness. Some of the milder problems experienced involved Greg's tendency to grab objects and constantly manipulating objects.

During pre-testing only two of the more severe problems were now seen as mild. These were Greg's excessive talking and difficulty staying seated. A deterioration noted was that Greg was starting to squirm in class. All the other soft signs and their severity stayed unchanged.

By the end of the program soft signs that did improve were that of his ability to play quietly and he appeared to be less restless, not squirming or fidgeting as much. Again Greg struggled keeping seated and stopping his excessive talking.

Differences in the Perceptions of Greg's Impulsivity

Differences in the teachers' perception of Greg's impulsivity are evident in Figure 45.

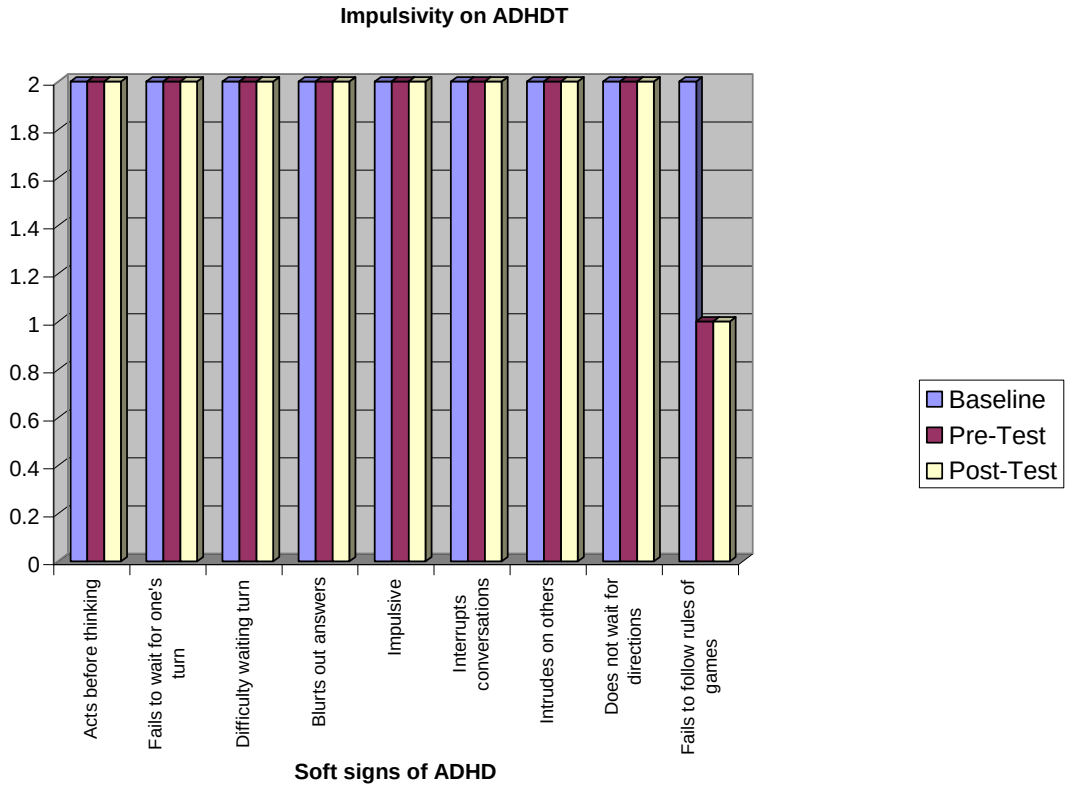

Figure 45

Soft signs of impulsivity reported by Greg's teacher

Greg's teacher reported that she experienced severe problems on all of the soft signs of impulsivity during baseline testing. These soft signs included acting before thinking, failing to take turns or waiting for his turn. Being very impulsive, he blurted out answers in class, interrupted conversations and intruded on others. He also found it difficult to wait for directions to be completed and failed to follow the rules of games.

By the time pre-testing was done all of these but being able to follow the rules of games had stayed the same and still caused severe problems.

By the end of the program none of the soft signs of hyperactivity had shown any improvement. Greg's' ability to follow the rules of games stayed the same as on the pre-test.

Differences in the Perceptions of Greg's Inattention

Differences in the teachers' perception of Greg's inattention are evident in Figure 46.

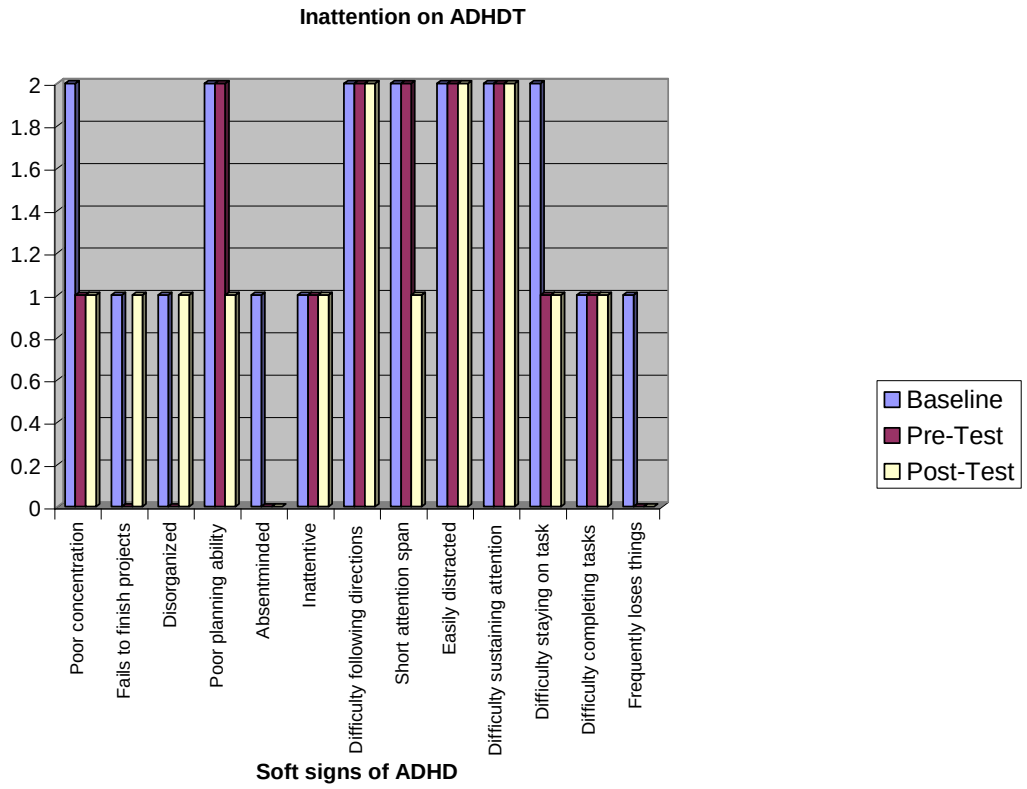

Figure 46

Soft signs of inattention reported by Greg's teacher

Greg's teacher reported that she experienced a few severe problems with some of the soft signs of inattention, as well as some milder problems when evaluating Greg's behaviour during the baseline assessment period. These soft signs caused severe problems including poor concentration, poor planning abilities, difficulty following directions, short attention span, difficulty sustaining attention and being easily distracted. Some of the soft sign that were seen as milder problems were failing to finish projects, disorganization, absentmindedness and inattention and the frequency of him losing things.

By the time pre-testing was completed, some of these soft signs disappeared completely, some were still the same as on baseline testing and some had become severe problems according to the teacher. She found Greg had become unable to finish projects, was very absentminded and had difficulty completing tasks in the classroom. By this time some of the soft signs were no longer a mild problem, but some of the signs which were not a problem during baseline testing seemed to cause mild concern. These were his inattention and poor planning abilities.

Some deterioration did however set in during the programme and by the end of the programme the teacher stated that there were severe problems when it came to Greg's ability to follow directions. He was still easily distracted and very absentminded.

Discussion

Greg did show improvement in terms of his motor proficiency and his teacher reported that Greg could follow the rules of games now, which was a huge improvement for the benefit of their "games class." The teacher was now often spared the outbursts and upsets that used to happen during this period. The teacher reported substantial improvements on his impulsivity and inattention from the pre to the post-test period.

In a study done by Harvey and Reid (1997) the fundamental gross motor performance and physical fitness of children with ADHD was found to be substantially below average. Greg did show signs of lower motor proficiency with initial testing. He did show improvement in motor proficiency over time and which demonstrates the value of participation in a gross motor skill programme such as Purposeful Play on improving children's motor proficiency. Improvements in motor proficiency may enable these learners to be more successful during their everyday tasks and help them to perform on the same physical, motor and cognitive level as their peers.

Michel *et al.* (2005) examined the effects of positive reinforcement on children struggling with signs of ADHD. In the study they found that children in the

ADHD group showed the greatest benefit from reinforcement, suggesting reward accounted for a substantial amount of variation in inhibition, using the stop signal paradigm. It was very clear that immediate feedback played a very important role in Greg's motivation and performance in the end. The AAP (2001) recommended using behavioural techniques for children with ADHD, especially elements of time-outs and response costs. Behavioural techniques played a very important role in the effectiveness of tasks and contact sessions with Greg. Greg tended to be over impulsive and act before thinking and got over-excited. As soon as he received feedback and positive reinforcement during difficult tasks he became more focused again and could conduct and complete the session without disruptive or destructive behaviours.

Greg would benefit greatly by participating in an additional sensory-motor program combined with an attentional skills development programme, especially if the AAP (2001) recommended behavioural and teaching strategies were implemented as an important part of the programme. These strategies seemed to help him gain more control during participation and not give up on activities which he disliked or with which he struggled. .

According to Engelbrecht (1989) children with learning difficulties first need to acquire effective strategies for learning in order to construct meaning effectively from environmental stimuli. These strategies which were used as part of the "Purposeful Play" programme showed to be effective, especially in Greg's case. If he could learn to implement strategies to control his emotions, he could learn how to control his focus of attention better which would help him to become more effective in each situation. Greg would benefit from teachers and coaches who could give him the necessary encouragement and motivation. The environment in which his future sessions are conducted should be relatively simple, without any unnecessary pictures and equipment around the room. The key to success with Greg will be strong leadership and frequent motivation and encouragement to sustain appropriate and acceptable behaviour.

Chapter Eight

Results and Discussion- Case Study Five

The children who volunteered to participate in this study attend a school that was established for children with special educational needs associated with the signs of ADHD. The names used in reporting the results of this research are not the actual names of the children who participated. Information about the lessons presented is included in separate Appendices for each child.

Alex

Alex was very quiet thirteen-year-old Grade 7 boy. . He was a very tall and slender boy for his age, with very low muscle tone. He appeared to be in a growth spurt, which might account in part for is lack of coordination. He complained of growing pains, especially his legs. He tended to slump in an effort to be closer to the height of the rest of his classmates. He also reported back pain in his lower back which could be a result not only of his very low muscle tone but also of his habitual slump. He appeared to be intelligent and was shy but very cooperative.

Baseline Assessment

Baseline assessment was completed during the four weeks prior to the beginning of the six-week intervention programme.

Observation

There are only a maximum of 10 learners in his specific class with a combination of Grade 6 and Grade 7 learners. On the day of observation at the school Alex struggled to pay attention in class. The teacher had to constantly check to see if he was doing his work because his attention would frequently wonder off, and he did his “own thing” like drawing pictures or scribbling. He demonstrated good interaction with friends in class and at break, although he did take the lead but always the followed. He appeared to be easily manipulated by the stronger person in the group.

Alex showed signs of excessive movement which was not put to good use. He was easy excited, had difficulty remaining seated. He would twist, wiggle, manipulating objects, fidget and squirm. He was generally very restless. Alex acted before thinking, failed to wait his turn, had difficulty waiting his turn, blurted out answers, was impulsive, interrupted conversations, intruded on others, did not wait for directions and failed to follow the rules of games. Alex was easily distracted, inattentive and had very poor concentration.

Alex's ADHDT Results

Alex's mother reported that Alex had many of the behavioural characteristics listed in the ADHDT (See Table 10).

His mother noted that the signs were not as severe as they used to be when Alex was younger. They have developed a few management skills over the years to make life easier for not only Alex but for his parents as well. According to her they experienced mild problems with twisting and wiggling, he found it difficult to stay seated and he was constantly manipulating objects. According to her, Alex was unable to play quietly and was very restless, fidgeting and squirming a lot.

His mother found Alex to be fairly impulsive in everything he does and they experienced problems with him acting before he thinks, failing to wait his turn and not waiting for his turn. He was impulsive, tended to blurt out answers, interrupted conversation, intruded on others and failed to wait for directions. Alex also had difficulty following the rules of games and made up his own rules as it suited him.

Alex demonstrated problems with inattention on the ADHDT. He was easily distracted and had poor concentration abilities.

Table 10

Soft Signs of behavioural problems reported by Alex's parent

Category on ADHDT	Soft Signs on ADHDT
Hyperactivity	Twists and Wiggling Difficulty remaining seated Constantly manipulating objects Fidgets Restless Squirms
Impulsivity	Acts before thinking Fails to wait one's turn Difficulty waiting one's turn Blurts out answers Impulsive Interrupts conversations Intrudes on others Does not wait for directions Fails to follow rules of games
Inattentiveness	Poor concentration Easily distracted

Alex showed many of the soft signs found on the ADHDT according to his previous teacher (See Table 11) but to a lesser extent according too his new teacher who started teaching at the school in June. His new teacher reported that Alex showed only a few signs of hyperactivity and showed mild problems with impulsivity but had no problems with inattention. This difference between the previous teacher and the new teacher may be because the teacher was only getting to know his new students. Alex showed most of the soft signs of impulsivity on the ADHDT. The teacher found that Alex acted before he thinks, failed to wait his turn, blurted out answers and failed to wait for directions. He was impulsive, interrupted conversations and intruded on others. Alex also found it difficult to follow the rules of games.

Table 11

Soft signs of behavioural problems reported on Alex experienced by previous teacher

Category on ADHDT	Soft Signs on ADHDT
Hyperactivity	Loud Twists and Wiggles Easily excited Excessive talking Difficulty remaining seated Constantly manipulating objects Inability to play quietly Fidgets Restless Squirms
Impulsivity	Acts before thinking Fails to wait one's turn Difficulty waiting one's turn Blurts out answers Impulsive Interrupts conversations Intrudes on others Does not wait for directions Fails to follow rules of games
Inattentiveness	Poor concentration Fails to finish projects Disorganized Poor planning ability Absentminded Inattentive Difficulty following directions Short attention span Easily distracted Difficulty sustaining attention Difficulty staying on task Difficulty completing tasks

Table 12

Soft signs of behavioural problems reported on Alex experienced by new teacher

Category on ADHDT	Soft Signs on ADHDT
Hyperactivity	Excessive talking
Impulsivity	Acts before thinking Fails to wait one's turn Difficulty waiting one's turn Blurts out answers Impulsive Interrupts conversations Intrudes on others Does not wait for directions Fails to follow rules of games
Inattentiveness	None

Alex's Motor Proficiency

Baseline testing on the BOTMP Short Form was completed four weeks prior to the beginning of the intervention programme. Alex scored 68 out of a possible 85 on the test. His scores were particularly weak on the following variables:

Manual dexterity.

Balance.

Speed and agility.

Strength.

Intervention Programme

BOTMP Pre-Test

On the day of the pre-test Alex tended to be very laid back and take life at his own pace. He was impulsive at times and acted before instructions had been given.

The results of this second administration of the BOTMP found that Alex's scores were low on the following variables:

Manual Dexterity.

Balance.

Agility.

Strength.

Alex was able to complete the tasks fairly easy when the focus was either on the upper or lower extremities. He however found tasks that involved the use of both the upper and lower extremities in completing a task very challenging and struggled to complete them successfully. Alex tended to work at his own pace.. He was successful at completing the tasks if he was encouraged and reminded of the activity all the time. His motor proficiency quickly deteriorated as soon as the element of speed or excitement is introduced. When working at his own pace he managed to complete some of these more challenging tasks but as soon as speed or distance or any other variable was either increased or decreased, his performance would "fall apart." Alex experienced a huge growth spurt during the June break and seemed almost uncomfortable in his own skin at times. He scored an overall total of 65 out of a possible 85 on the BOTMP.

Purposeful Play Sessions

The Intervention programme for Alex began the first week in August and was conducted every Tuesday for six weeks. His 30-minute session was usually at 13:30. A review of the lesson plans documented the overall programme focus in

terms of the development of his attentional skills (see Figure 47). "Controlling distractibility" was the most common lesson focus, followed by "controlling time-on-task" and "discriminating among cues effectively."

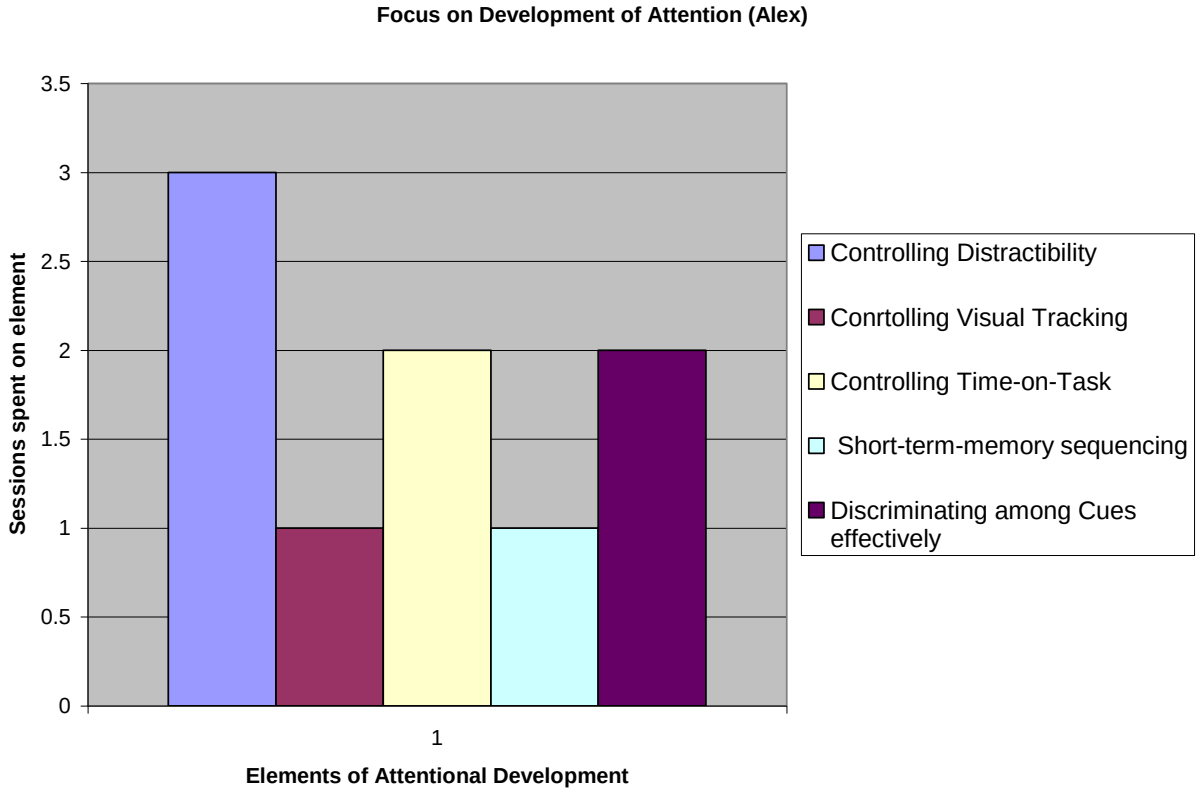

Figure 47

Focus for the development of Alex's attentional skills

The overall programme focus on sensory-motor content is reported in Figure 48. Activities that developed body awareness, proprioceptive sensitivity and visual skills development were the most frequently presented for Alex. The predominant teaching strategies used to support Alex's participation during the programme were verbal cues, immediate feedback, demonstrations and motivational comments (See Figure 49).

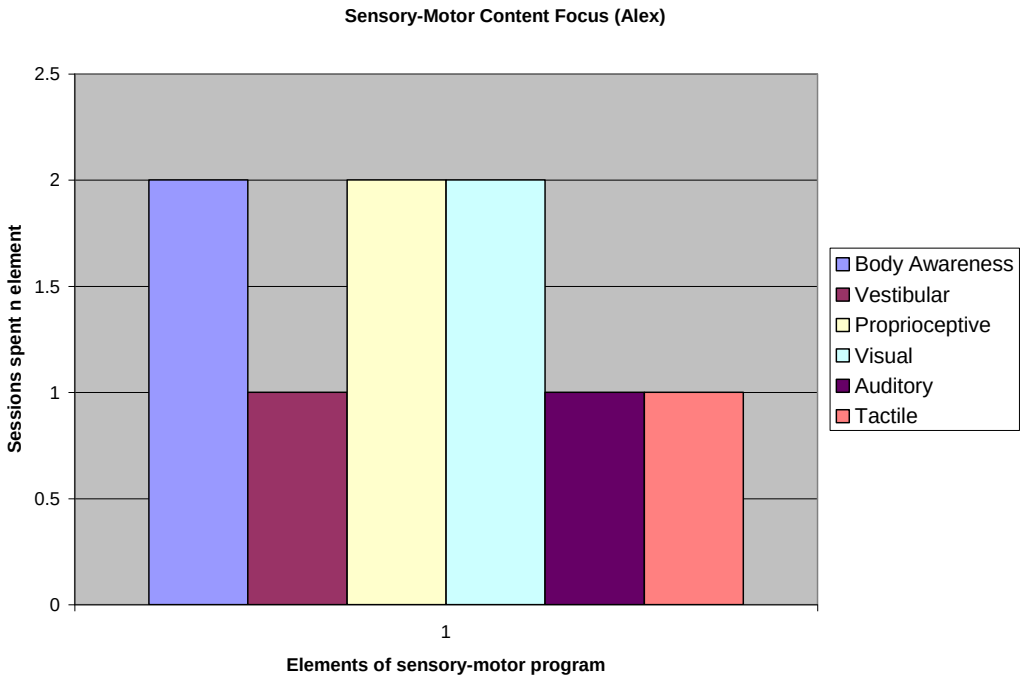

Figure 48

Focus for the development of Alex's sensory-motor skills

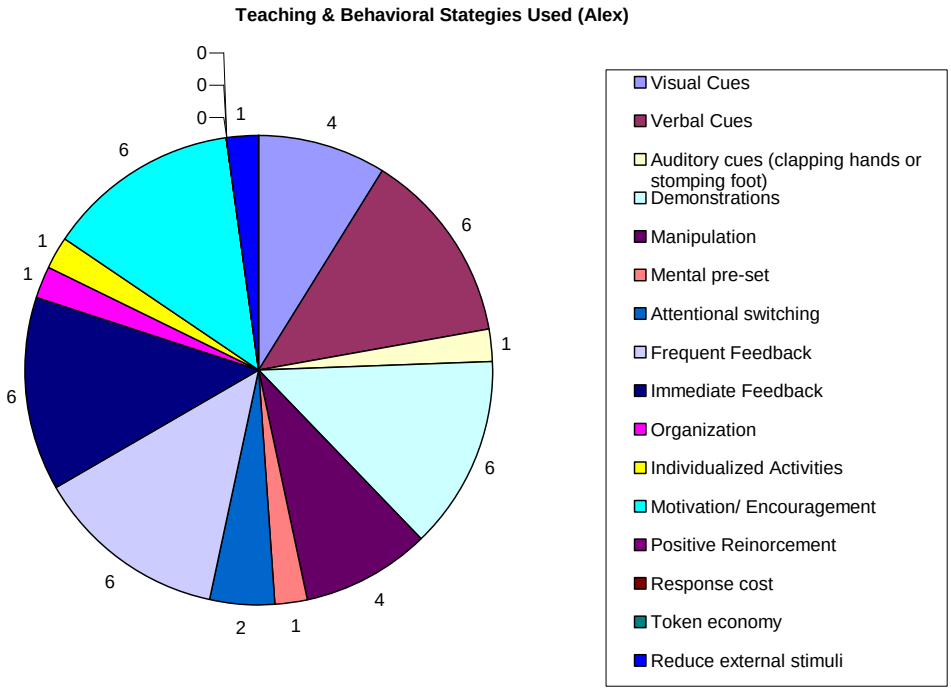

Figure 49

Predominant teaching strategies used during Alex's sessions

Session One

During the first session of the programme the focus was on developing proprioception and the vestibular system. All exercises on the floor and Swiss ball were focused on testing proprioception and strengthening the core muscles needed for postural control. Alex was extremely weak in the core and struggled to keep his extremities stable when the focus was on the core of his body. His weak core could also contribute to his inability to stay in his seat in the class environment and constant shifting in his seat.

According to Solan *et al*. (2007) problems with vestibular function can also be associated with deficits in object recognition, spatial navigation, learning and memory as well as with the commonly known deficits in balance and posture. One mechanism by which vestibular disorders adversely affect attention is the distracting influence of increased body sway and postural lean. Additionally, vestibular disorders are often accompanied by associated psychological conditions, which may include anxiety and depression, both of which can negatively affect the cognitive resources available for information processing.

Overall Alex had a good sense of body awareness but his lack of core stability influenced effective movement. He struggled staying on the Swiss ball at times because of his very weak core. His inability to keep focused and stay on track caused him to make unnecessary mistakes in performing body awareness tasks. Instructions had to be repeated a few times during the execution of the task at hand to keep him focused. Cues had to be repeated to remind him to finish the task and to focus on the use of his body. Constant visual contact with the programme leader, refocusing and repetition was needed to keep Alex focused during a session. He soon gave up on an activity when he felt it to be too difficult for him or if he struggled in any way.

Homework after session one. After the first session Alex was asked to practice the “bridge” formation on the floor at home, a core stabilizing exercise. During the session he mentioned that they did have a Swiss ball at home and he use to do activities on it when he was younger. He was therefore encouraged to do some of these exercises again during the coming weeks of the programme.

Session Two

The focus of the second session was on visual tracking and coordination. The session was conducted outside and it was soon learned that Alex was very fond of being outside in fresh air and sunshine. Alex struggled with manipulation of objects, but showed some skill at manipulating bigger objects when skills with hand-eye and foot-eye coordination were required. However, as soon as the manipulated object decreased in size or he was encouraged to move faster, he found it very difficult to successfully perform. He seemed to become uncomfortable in his own body and gave up easily if the task was a bit too challenging. Concurrent feedback, reinforcement and visual cues where needed to keep him on track and allowing him to successfully finish each task. Alex showed a lot of unnecessary movements, wiggling, squirming and restlessness during activities. Without repeating instructions and cues he soon failed to keep on track and started doing his own thing or gave up entirely.

Homework after session two. At the end of this second session he was told to practice his modified juggling skills at home. This entailed two socks being folded into two little balls and then juggling with these “balls.” He was also asked to practice one handed throwing against a wall or with a friend or family member.

Session Three

The third session focused on body awareness and memory sequencing. Alex showed good body awareness capabilities as well as good memory sequencing capabilities. Alex tended to struggle with memory sequencing when he was not encouraged or motivated enough. When listening to directions and instructions he tended to remember the first and last part of the instructions but failed to remember the middle part of the instructions every time. The more time spent on these types of activities, including efforts to make the instructions more visual, the more Alex showed signs of improvement and the more capable he was of remembering the middle section of instructions. At the end of the session Alex did some of the activities while standing on a boso ball but struggled staying centred on the ball, probably because he has very low muscle tone and needs proprioceptive stimulation.

Homework after session three. At the end of this session Alex revealed that he did not practice the previous weeks' "homework" that often. He was encouraged to practice the same activities as he was supposed to do during the previous two weeks.

Session Four

The fourth session focus was on "time-on-task" activities and mental set by means of verbal cueing. Each activity was fully described to Alex and then he was asked to repeat the instructions and tell the session leader how he would go about executing the task. This mental set and step-by-step rehearsal helped Alex during the execution of the task. This helped him stay on task more and not being so distracted by external stimuli or internal stimuli. He was supposed to concentrate on his own voice and instruction throughout the activity.

Alex tended to put too much focus on detail during some tasks which led to a very slow pace of doing things. He needed constant reminders of what was important. Alex found it very difficult to wait his turn and acted very impulsively. He often started with some activities even before instructions had been completed.

Homework after session four. Alex mentioned that they had the same type of games at home and was encouraged to play it with his younger sister or older brother.

Session Five

The fifth session included various colours, shapes and sizes. Colours varied from blue, green, yellow, red and orange. The shapes of the targets varied from a target hoop on the wall to a bucket or hoop on the floor, as well cones and beacons. Sizes of the targets and the equipment varied. Targets were small hoops, large hoops, buckets or beacons. Throwing equipment varied from beanbags to tennis balls, different colour softballs and handballs. Target games where the main game, challenging aiming, distractibility and focus in every possible way. Attentional focus was on distractibility and focus among different cues. The sensory-motor focus was on the visual system, as well as the proprioceptive system to a lesser degree (See Figure 47 and 48). Alex enjoyed all

the activities and showed good skill and performance. He needed constant encouragement as he easily tired, complained about lower back pain and tended to give up on the task as soon as he did not manage to successfully complete it or he did not find it interesting anymore. He needed to be reminded of the outcome of every single activity and the starting point and focus had to be repeated before each activity. He overcorrected and struggled with force control, making the teaching strategies of encouragement and motivation important.

Teaching and behavioural strategies during the session were elements of demonstration, refocusing and verbal cueing as well as a lot of motivation to keep him on track (See Figure 49).

Homework after session five. Alex was instructed to use all possible items he could find at home that he could use to throw with to practice throwing it into buckets, wash baskets etc.

Session Six

During the sixth session the focus was activities from previous sessions with which the Alex had struggled. . It was however very hard to keep Alex focused throughout the session as he was complaining about leg and lower back pain the whole time. Teaching and behavioural strategies used throughout included focused feedback and encouragement to keep him on track and keep him from giving up. Verbal cues and feedback were needed throughout to keep him on track.

Post-programme assessment

The BOTMP was administered immediately after the conclusion of the intervention programme during the 10th week of the study. The parents and the teacher were asked to continue to complete the ADHDT for weeks 11 and 12 in order to determine if the programme had any impact on Alex's behaviour. Changes in motor proficiency were tracked by comparing the baseline results with the pre-test and post-test results. Changes in ADHD were tracked first by drawing a chart of the changes in hyperactivity, impulsivity and inattention. Then, comparison of changes in the soft signs in each category were tracked by

comparing week one reports (baseline) with week 5 (pre-test) and week 12 (post-test) results.

Changes in Alex's Motor Proficiency

During post-testing Alex was more calm and focused and very cooperative. He was more cooperative in waiting for instructions to be completed before he began with an activity. He showed good improvement on subtests of bilateral coordination, balance, agility and upper-limb coordination. The biggest struggle was however still with strength, especially upper body and shoulder girdle strength. Alex's total score on the BOTMP short form test improved to a 70 score out of a possible 85.

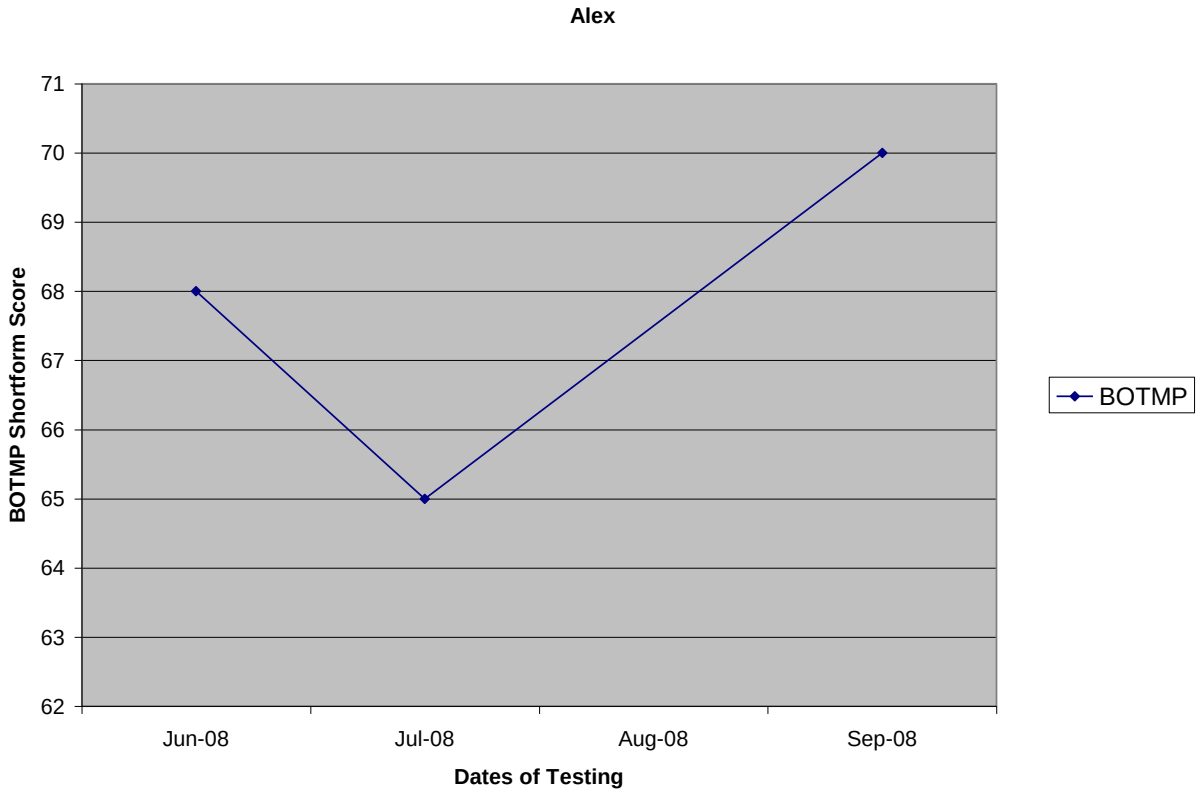

Figure 50

Changes in BOTMP results for Alex

Alex's results for the baseline, pre- and post-test on the BOTMP Short form were made up out of 8 variables (See Figure 51).

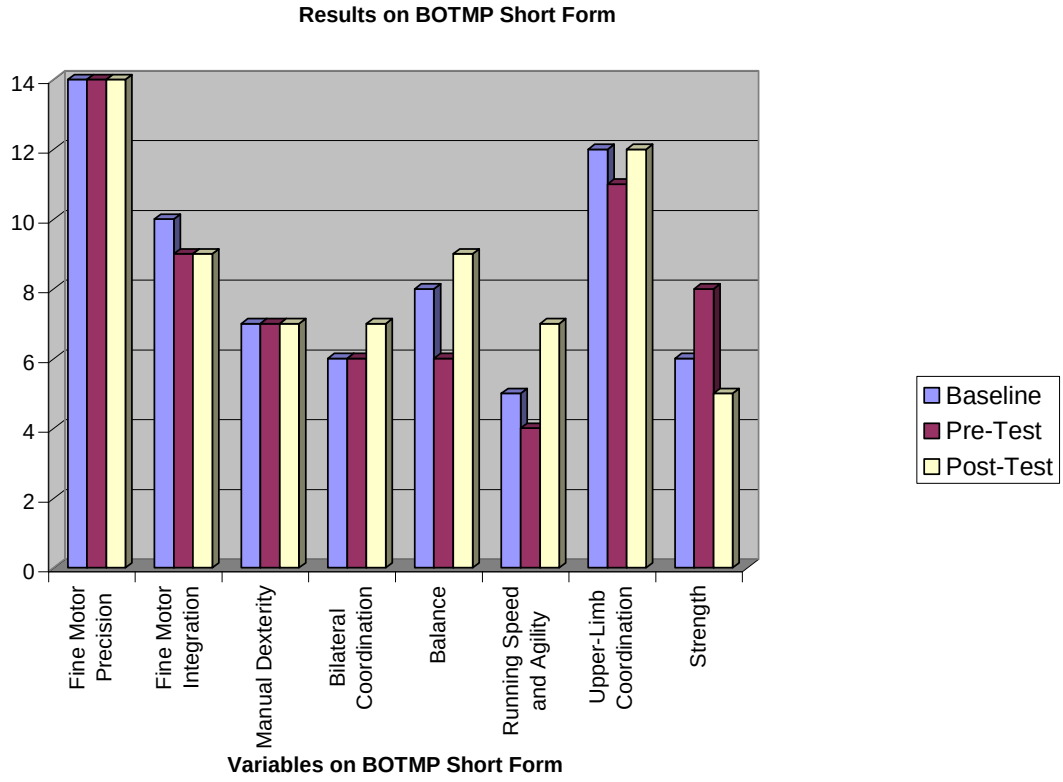

Figure 51

Changes in BOTMP according to each of 8 variables

1. Fine Motor Precision

On the baseline test Alex had done very well on the drawing lines through paths tasks as well as on the folding paper task. He scored the maximum amount of points on both of the tests, earning himself 14 points in total. His pre-testing and post-testing scores were the same as baseline, with Alex scoring the maximum amount of points on each test every time.

2. Fine Motor Integration

Alex was able to copy both the square and star. He scored 5 points for copying the square and 5 for the star during baseline testing. During pre-testing

his ability to copy the square for the maximum amount of points stayed the same. However, he struggled with completion of the edges of the star and scored 4 out of a possible 5 points for the task. During post-testing Alex's scores were the same as he scored during completion of the tasks during pre-testing.

3. Manual Dexterity

On the baseline test Alex was able to transfer between 15 and 16 pennies during the 15 seconds and scored 7 points on the test. During pre-testing he transferred the same amount of pennies during the 15 seconds as he did on the baseline test and again scored 7 points during pre-testing on transferring pennies. His score stayed the same for that of his post-test, scoring 7 points out of a possible 9 by transferring between 15 and 16 pennies during the 15 second test.

4. Bilateral Coordination

On the baseline attempt Alex was able to complete 5 successful jumps on the test, earning 3 points on this attempt. During the tapping task during baseline testing he was able to complete between 5 and 9 taps and scored 3 points. During pre-testing Alex was able to achieve a maximum score on the tapping task but was only able to score 2 points on the synchronized jumping task; only being able to achieve between 2 and 4 successful jumps. During post-testing he was again able to achieve a maximum score on the synchronized tapping task and improved on the jumping task, scoring a maximum amount of points on both tasks. He scored 3 points on the jumping task which means he was able to perform 5 synchronized jumps and 4 points on the tapping task as he was able to perform 10 synchronized taps during the task.

5. Balance

During baseline, pre- and post-testing Alex was able to score the maximum amount of points on the task testing his ability to walk forward on a line. He had difficulty with his balancing on one leg on a balance beam for 10 seconds with his eyes open, perhaps because the test was after he had undergone a major growth spurt during the mid-year break. During baseline testing he was able to balance for between 10 seconds on the beam, scoring 4 points on the task. During pre-testing

he struggled quite a bit and was only able to balance between 3.0 and 5.9 seconds on the balance beam, scoring 2 points on the task. During post-testing he again showed improvement and was able to balance between 6.0 and 9.9 seconds on the balance beam, scoring 3 points on the task.

6. Running Speed and Agility

During baseline testing Alex was only able to do between 15 and 19 correct hops, earning himself 5 points on the task. During pre-testing he was only able to do between 10 and 14 successful hops, earning himself only 4 points on the test. During post-testing he improved quite a lot from the pre-test and was able to do between 25 and 30 hops, scoring 7 points on the task.

7. Upper-Limb Coordination

During baseline testing Alex was able to perform 5 successful dropping and catch actions and 10 dribbling actions on the tests. He scored 5 points on the drop and catch task and 7 points on the dribbling task during baseline testing. During pre-testing he again scored 5 points on the dropping and catch task but was only able to score 6 points out of a possible 7 on the dribbling task; him only being able to do between 8 and 9 correct dribbling actions. During post-testing he was again able to score the maximum amount of points on each of the tasks.

8. Strength

During baseline testing it was found that Alex was only able to perform between 6 and 10 successful push-ups during the 30 seconds and between 6 and 10 sit-ups. During pre-testing his scores on the push-ups and sit-ups improved and he was able to score 4 points on each of the tasks, performing between 11 and 15 push-ups and between 11 and 15 sit-ups. His score on the push-up test deteriorated and he was only able to perform between 3 and 5 correct push-ups, scoring only 1 point on this task during post-testing. During post-testing his score on the sit-up task also deteriorated and he was only able to do between 6 and 10 sit-ups, scoring only 3 points on the 30 second test.

Changes in Alex's ADHDT Results

The ADHDT results by the parent were never received back after the study. Alex's mother was contacted several times to which she replied that the housekeeper had seen the envelope as something that was past due because it had been folded and crumbled by the toddler in the house and thought that it was time to put it in the bin.

The ADHDT results by the teacher at the end of the study showed mixed results over time. Although some of the soft signs of inattentiveness were not seen as a problem before, they became a problem. Some of the signs of impulsivity were reported to have improved (See Figures 52).

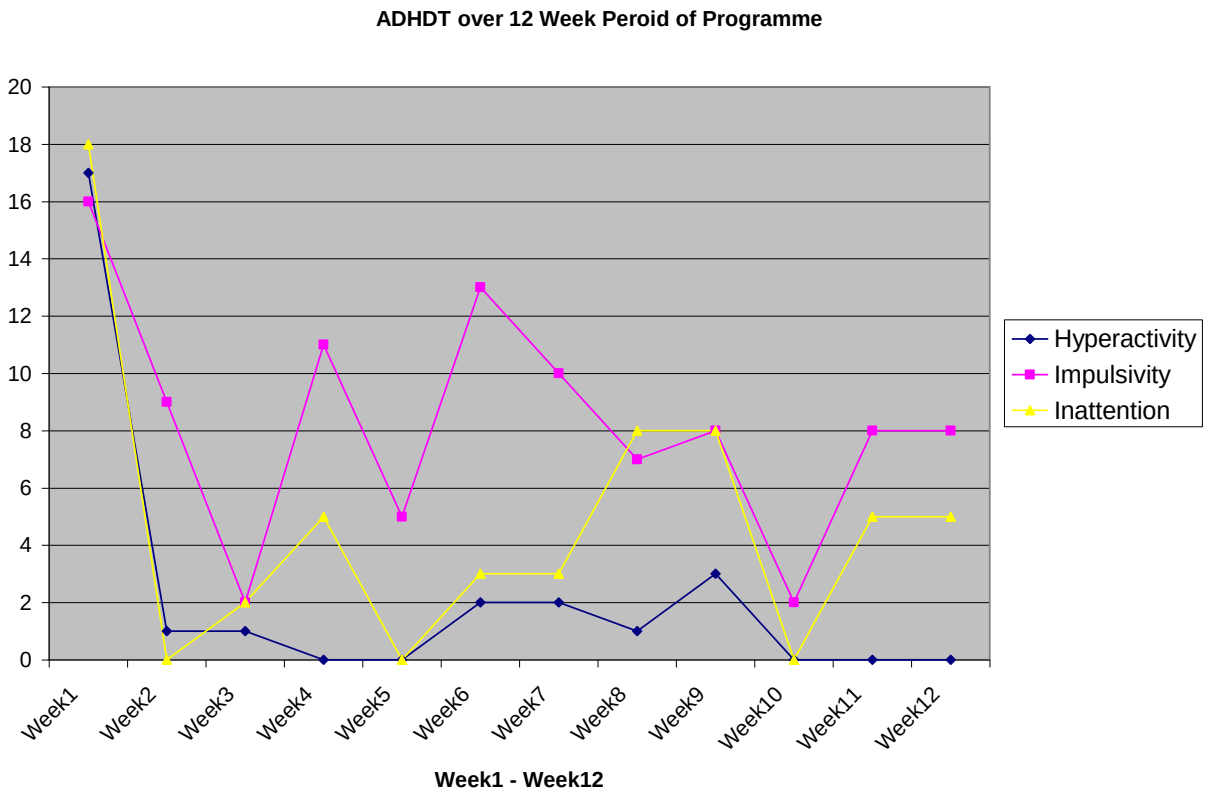

Figure 52

ADHDT results submitted by Alex's teacher over 12 weeks

Differences in Perceptions of Alex's Hyperactivity

Differences in the levels of hyperactivity of Alex are reported to each of the items on the ADHDT sub-scale. These are evident when looking at Figure 53.

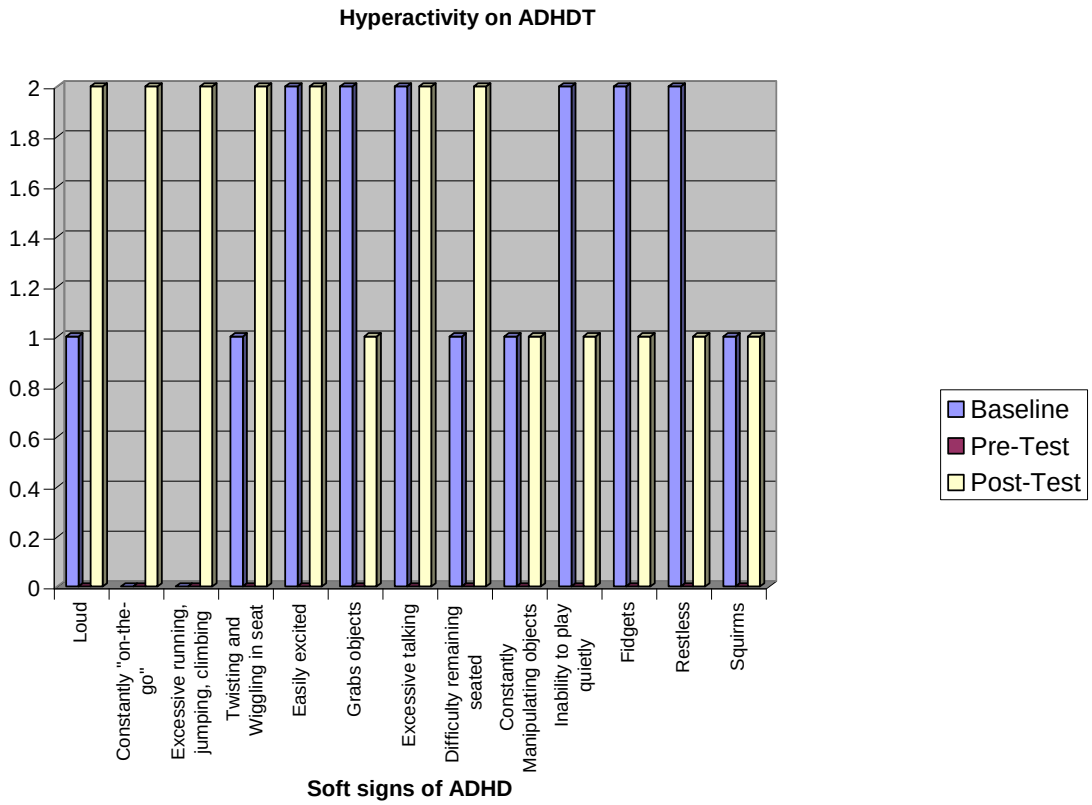

Figure 53

Soft signs of hyperactivity reported by Alex's teacher

Alex's teacher reported severe problems on some of the soft signs in the category of hyperactivity and its severity. At the beginning of the programme during baseline testing he stated that Alex showed severe problems on soft signs of being easily excited, excessively talking and grabbing objects. He also noted Alex's inability to play quietly, as well as his fidgeting, squirming and restlessness. Some of the milder problems experienced involved Alex's tendency to be very loud, twisting and wiggling, his difficulty remaining seated and his constant manipulation of objects.

During pre-testing none of the soft signs seemed to be a problem to the teacher. This may only be because the teacher was still new in the school, learners were at their best behaviour or the teacher was more giving in some instances, overseeing some behaviours in class that would have otherwise have been seen as typical soft signs behaviour of hyperactivity for the particular child.

By the end of the program there was deterioration in the soft signs of hyperactivity, some becoming severe towards the end of the programme. These soft signs were; being loud, excessive talking and having excessive movement, constantly on the go, twisting and wiggling, being easily excited and having problems keeping seated.

Most of the other soft signs stayed the same, rated as mild problems with only one showing an improvement.

Differences in the Perceptions of Alex's Impulsivity

Differences in the teachers' perception of Greg's impulsivity are evident in Figure 54.

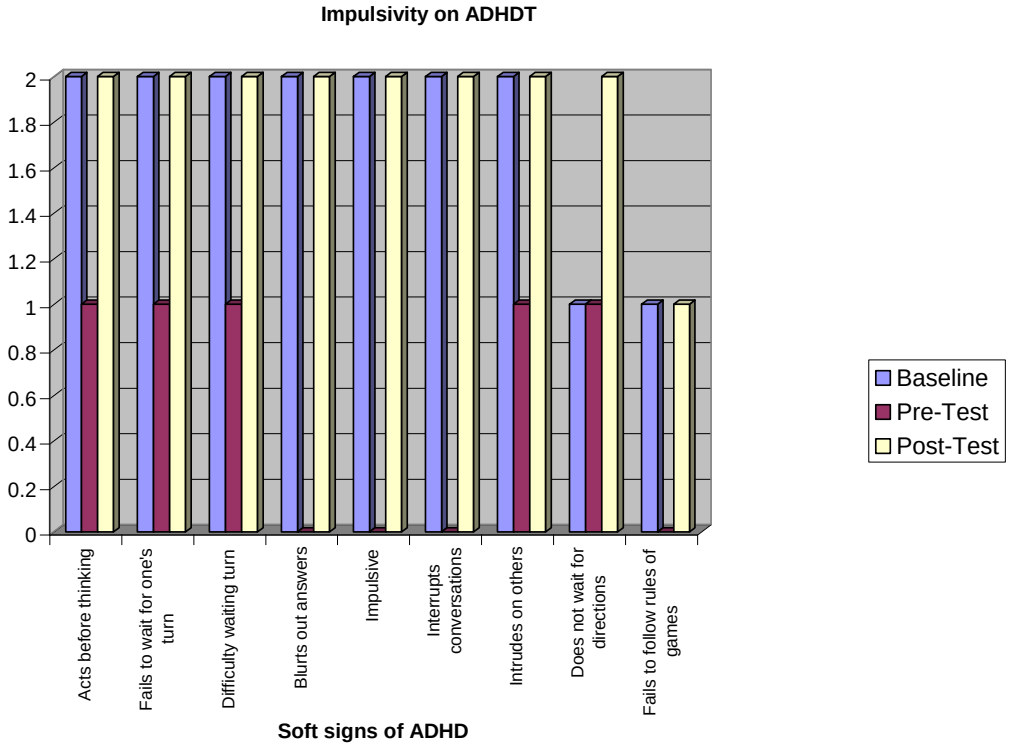

Figure 54

Soft signs of impulsivity reported by Alex's teacher

Alex's teacher reported that he experienced severe problems on some and mild problems on two of the soft signs of impulsivity during baseline testing. These soft signs included acting before thinking, fails to take turns or waiting for his turn, being very impulsive, blurting out answers in class, interrupting conversations and intruding on others. Finding it difficult in waiting for directions to be completed and failing to follow the rules of games were some of Alex's mild problems.

During pre-testing all of these soft signs had either disappeared and not experienced as a problem anymore or had improved so that it did not pose severe problems anymore. By the end of the program none of the soft signs of hyperactivity had shown any improvement.

Differences in the Perceptions of Alex's Inattention

Differences in the teachers' perception of Alex's inattention are evident in Figure 55.

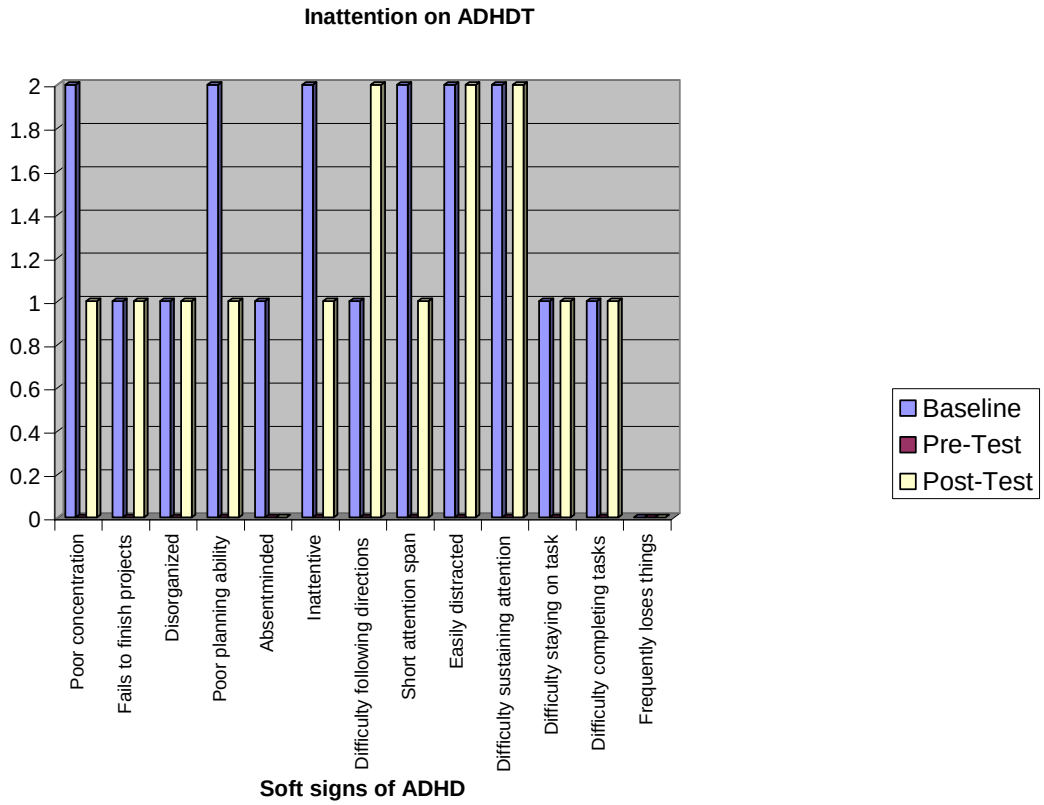

Figure 55

Soft signs of inattention reported by Alex's teacher

Alex's teacher reported that he experienced a few severe problems with some of the soft signs of inattention, as well as some milder problems, when evaluating Alex's behaviour during the baseline assessment period. These soft signs which caused severe problems included poor concentration, poor planning

abilities, inattention, short attention span and his difficulty sustaining attention. Some of the soft signs that were seen as milder problems were failing to finish projects, disorganization, absentmindedness and inattention and his difficulty following directions, staying on task and completing tasks.

By the time pre-testing was done none of these soft signs features and according to the teacher no problems were evident with any.

Some deterioration did however set in during the program, or it might be that more accurate ratings were made on the post-test because the new teacher was getting to know all his learners the behaviours rated as problems by the first teacher on the baseline assessment were now more apparent to the new teacher.

Discussion

Alex did show improvement in terms of his motor proficiency (Figure 50). His teacher reported mixed findings on the ADHDT. This can be influenced by the fact that the teacher did not know Alex that well at the beginning of the programme. Alex's behaviour was also certainly affected by the situation in his home. He was informed by his parents that they were having a divorce; during the course of this program and emotional factors may have had a huge influence on his behaviour.

Harvey and Reid (1997) found that fundamental gross motor performance and physical fitness of children with ADHD were substantially below average. Alex did show signs of lower motor proficiency with initial testing. He showed improvement in motor proficiency over time which supports the value of a gross motor programme on improving children's motor proficiency. The decrease in motor proficiency after baseline testing could be because of his family problems. It is important for the ADHD child, family members and programme coordinator to have a professional, trusting and open relationship, even regarding private matters regarding home and family. This openness can contribute to helping the learner involved with effective management skills to not only cope with the effects of ADHD on his/her life but also the effects of everyday life situations which could complicate life even more.

Michel et al. (2005) examined the effects of ‘positive reinforcement’ on children struggling with signs of ADHD. In the study they found that children in the ADHD group showed the greatest benefit from reinforcement, suggesting reward accounted for a substantial amount of variation in inhibition. There is also evidence that highly motivating consequences (compared to a task with less motivating consequences) significantly improved response inhibition in children with ADHD. It was very clear that immediate feedback played a very important role in Alex’s motivation and performance. Using the AAP (2001) recommended behavioural techniques and teaching strategies for children with ADHD, especially elements of positive reinforcement and token-economy played a very important role in the effectiveness of tasks and contact sessions with Alex. As soon as he received feedback and positive reinforcement during difficult tasks he became more focused again and could conduct and complete the session more effective, reaching the outcomes and focus set for the specific session.

Alex could benefit greatly by participating in a general physical activities program combined with an attentional skills development programme such as the Purposeful Play programme. Alex needs to feel comfortable in his own skin again and get to know his changing body’s capabilities. Physical activity and partaking in different activities may not only be beneficial in his muscle strengthening and development, but could also help him to cope better with the changes taking place in their family life and household. Future sessions should focus mainly on the vestibular and proprioceptive sensory-motor systems.

Hougton *et al.* (2004) stated that a recent theoretical model of ADHD proposed that the essential impairment in ADHD is one of behavioural inhibition and that this leads to secondary impairment in other executive functions, such as operation of working memory, internalization of self-directed speech, controlling mood, motivation and arousal and reconstitution. These researchers did a study on the effects of computerized laboratory- based tasks and motor control of ADHD children. The studies findings supported the notion of Barkley’s (1997) model which posits that the inhibitory deficits associated with ADHD lead to secondary impairments in other neuropsychological abilities, which in turn decreased effectiveness in motor control. ADHD boys in his study took less time to complete

their trials under the direct condition (no working memory load and no distracters) on the game, compared to their matched non-ADHD peers, which is in line with the general clinical perception of the children as individuals who carry out tasks impulsively in the quickest possible time but in doing so commit more errors. Later performance showed that these boys with ADHD could overcome the difficulties in persistence using computerized-based continuous performance tasks. Academically, computer games offer teachers, clinicians and parents increased opportunities to assist children with ADHD to maximize their learning potential. Allowing these children to successfully deploy executive functions (including motor control) might increase concentration, reduce unwanted hyperactive-impulsive and inattentive behaviours, and hence increase the quality and quantity of academic work produced. Similar programmes and studies should be taken into account when re-evaluating and re-planning programmes appropriate for Alex as computer skills and his interest in computers are very good and he feels more confident and comfortable in that arena. This approach may make him more comfortable at first and then moving on from there to move to the more physical and motor performance side of a programme.

The key to success with any programme regarding and involving Alex will be repetition, motivation, support and trust. Alex is a very sensitive child and very shy at first. As soon as you have earned his trust and confidence he is more open to new things and eager to try new and more difficult/ challenging activities.

Chapter Nine

Conclusions and Recommendations

Several conclusions can be made about intervention programmes for children showing signs of ADHD based on the results of this study:

Conclusions about the Research Questions

Research Question One

1. Will a “Perceptual- motor” programme improve the movement proficiency of children who show signs of ADHD?

Yes. Nadia was still showing some signs of rigid and immature movements. However, she showed substantial signs of improvement on variables such as bilateral coordination, balance, agility and upper-limb coordination. Nadia’s total score for motor proficiency on the BOTMP improved to a 52 score out of a possible 85

Yes. Arno showed good improvement on subtests of bilateral coordination and upper-limb coordination. The biggest struggle was however still with agility and balance. Arno’s total score on the BOTMP short form test improved to a 59 score out of a possible 85

Yes. Ernie showed good improvement on subtests of balance and manual dexterity. There were minor improvements on some of the other subtests as well; as Ernie faired fairly worse during Pre-testing than during baseline testing. Ernie’s total score on the BOTMP short form test improved to a 75 score out of a possible 85.

Yes. Greg showed good improvement on subtests of bilateral coordination, balance and agility. There was not much improvement on strength as there was not much emphasis placed on the particular aspect during the programme. Greg’s total score on the BOTMP short form test improved to a 71 score out of a possible 85.

Yes. Alex showed good improvement on subtests of bilateral coordination, balance, agility and upper-limb coordination. The biggest struggle was however still with strength, especially upper body and shoulder girdle strength. Alex's total score on the BOTMP short form test improved to a 70 score out of a possible 85.

Research Question Two

2. Will a "Perceptual- motor" programme have a positive impact on the attentional capabilities of children who show signs of ADHD, based on improvements of their behavioural soft signs (hyperactivity, impulsivity and inattention) as reported by their teachers?

Nadia

Yes. Nadia's teacher reported several changes on the soft signs of inattention during the duration of the programme. During the initial testing she indicated that Nadia had severe problems with concentration and sustaining attention and all of the other soft signs of inattention. During post-testing she indicated that Nadia had shown improvement in the elements of poor concentration and her ability to sustain attention but it did pose to be a mild problem still. She found no improvement on the soft signs of failing to finish projects, disorganised, poor planning ability, absentmindedness and inattention, following direction, frequently losing things, difficulty staying on task and completing tasks. According to the teacher Nadia showed deteriorations in attention span, distractibility, sustaining attention and difficulty staying on task and completing tasks.

Nadia's teacher reported several changes on the soft signs of hyperactivity during the duration of the programme. During the initial testing she indicated that Nadia had mild problems with twisting and wiggling in her seat, remaining seated, excessive talking, constantly manipulating objects, as well as fidgeting and restlessness. By the post-testing she indicated that Nadia had shown no improvement in any of the soft signs on the ADHDT. According to the teacher Nadia showed deteriorations in her ability to play quietly, she was easily excited and tended to grab objects and also squirmed in class. Nadia's mother reported several changes on the soft signs of Impulsivity during the duration of the

programme. During the initial testing she indicated that Nadia had severe problem with acting before thinking, failing to take turns and failing to wait turns. As well as impulsiveness, blurting out answers, interrupting conversations, intruding on others and failing to wait for directions, as well as following the rules of games.

Nadia's teacher reported several changes on the soft signs of impulsivity during the duration of the programme. During the initial testing she indicated that Nadia had mild problems with impulsivity, acting before thinking, blurting out answers, interrupting conversations and intruding on others. By the time post-testing she indicated that Nadia had only shown improvement in her ability to not intrude on others and follow the rules of games, but no improvement in any of the other soft signs. According to the teacher Nadia showed deteriorations in her ability to wait her turn and take turns during pre-testing but indicated that it did improve by the time of post-testing.

Arno

Yes. Arno's teacher reported no severe problems with any of the soft signs of hyperactivity during the study. At one time during the programme she did report that Arno showed mild problems with fidgeting in class, but this was just after a minor alteration in his medication and towards the end of the programme this returned to normal according to her.

Arno's teacher reported no severe problems with any of the soft signs of impulsivity during the study. During the programme she did report that Arno showed mild problems with impulsivity in class, this stayed a mild problem throughout the duration of the programme.

Arno's teacher reported several changes on the soft signs of inattention during the duration of the programme. During the initial testing she indicated that Arno had severe problems with concentration, failing to finish projects, attention span, distraction, sustaining attention and staying on task. He showed mild problems with being disorganised, poor planning, inattention, and ability to complete tasks. Some of the severe problems stayed the same during the programme, bur the milder problems also became quite severe at one stage. These all however changed by the end of the programme. The short attention

span and difficulty sustaining attention in class still posed problems at the end of the programme but they were not seen as severe anymore. It is difficult to say if these changes were brought on by the alteration in Arno's medication during the programme or by the effects the programme had on Arno's abilities. The ADHDT results by the teacher at the end of the study showed a huge improvement in the category of inattention. Although some of the soft signs of inattentiveness did not disappear they did improve over time.

Ernie

Yes. Ernie's teacher reported great fluctuations in the soft signs of hyperactivity on Ernie. At the beginning of the programme during baseline testing she stated that Ernie was constantly wiggling and twisting in his seat, manipulating objects, fidgeting, being restless and squirms, as well as being easily excited are all mild problems in his case. As many as four of these elements had changed by the time of the pre-test and did not pose a problem anymore. These soft signs were: twisting and wiggling, constantly manipulating objects, restlessness and squirming. By the end of the programme these soft signs all appeared again and posed a mild problem during daily functioning. The teacher however found that twisting and wiggling became a severe problem along with fidgeting.

Ernie's teacher reported that she experienced a few mild problems with some of the soft signs of inattention when evaluating Ernie's behaviour during the baseline assessment period. These soft signs included: failing to finish projects, having difficulty following directions, difficulty sustaining attention and completing tasks. Ernie being very absentminded caused severe problems according to the teacher.

By the time pre-testing was done some of these soft signs had become severe problems according to the teacher. She found Ernie being unable to finish projects, being very absentminded and having difficulty completing tasks as being severe problems in the classroom life of Ernie. By this time some of the soft signs were no longer a mild problem, but some of the signs which were not a problem during baseline testing seemed to cause mild concern; these were: his inattention and poor planning abilities. Some deterioration did however set in during the

programme and by the end of the programme the teacher stated that there were severe problems when it came to Ernie's ability to finish projects and him finding it very difficult completing tasks.

The ADHDT results by the teacher at the end of the study showed a huge improvement in the category of impulsivity; but deterioration in the values of hyperactivity and inattention. Although some of the soft signs of inattentiveness did not disappear they did improve over time

Greg

Yes. Greg's teacher reported severe problems on Greg's behalf in the category of hyperactivity and its severity. At the beginning of the programme during baseline testing she stated that Greg showed severe problems on soft signs like: being loud, on the go, excessive movements, twisting and wiggling, excessive talking, inability to play quietly, fidgeting and restlessness. Some of the milder problems experienced involved Greg's tendency to grab objects and constantly manipulating objects.

During pre-testing only two of the more severe problems were now seen as mild, these were Greg's excessive talking and difficulty staying seated. A deterioration noted was that Greg was starting to squirm in class. All the other soft signs and their severity stayed unchanged. By the end of the programme soft signs that did improve in severity were that of his ability to play quietly, he was less restless, did not squirm or fidget as much. Again Greg struggled keeping seated and stopping his excessive talking.

Greg's teacher reported that she experienced severe problems on all of the soft signs of impulsivity during baseline testing. These soft signs included: acting before thinking, fails to take turns or waiting for his turn. Being very impulsive, blurting out answers in class, interrupting conversations an intruding on others; as well as finding difficulty in waiting for directions to be completed and failing to follow the rules of games. By the time pre-testing was done all of these but being able to follow the rules of games had stayed the same and still caused severe problems. By the end of the programme none of the soft signs of hyperactivity had

shown any improvement. Greg's' ability to follow the rules of games stayed the same as on the pre-test.

Greg's teacher reported that she experienced a few severe problems with some of the soft signs of inattention, as well as some milder problems, when evaluating Greg's behaviour during the baseline assessment period. These soft signs which cause severe problems included: poor concentration, poor planning abilities, difficulty following directions, short attention span, difficulty sustaining attention and easily distracted. Some of the soft sign that were seen as milder problems were: failing to finish projects, disorganisation, absentmindedness and inattention and he frequently losing things.

The ADHDT results by the teacher at the end of the study showed mixed findings. Some of the soft signs on the ADHDT did improve while others became a problem or stayed a problem. The ADHDT results from the teacher also showed an improvement and stabilizing curve in overall impulsivity and inattention towards the end of the programme, while hyperactivity stayed a problem. Some deterioration did however set in during the programme and by the end of the programme the teacher stated that there were severe problems when it came to Greg's ability to follow directions, he was still easily distracted and very absentminded.

Alex

Yes. Alex's teacher reported severe problems on some of the soft signs in the category of hyperactivity and its severity. At the beginning of the programme during baseline testing he stated that Alex showed severe problems on soft signs like: being easily excited and excessive talking, grabbing objects, his inability to play quietly; as well as aspects of fidgeting, squirming and restlessness. Some of the milder problems experienced involved Alex's tendency to be very loud, twisting and wiggling, difficulty remaining seated and constantly manipulating objects.

During pre-testing none of the soft signs seemed to be a problem to the teacher. This may only be because the teacher was still new in the school, learners were at their best behaviour or the teacher was more giving in some

instances, overseeing some behaviours in class that would have otherwise have been seen as typical soft signs behaviour of hyperactivity for the particular child.

By the end of the programme there was deterioration in the soft signs of hyperactivity, some becoming severe towards the end of the programme. These soft signs were: him being loud, excessive talking and having excessive movement, constantly on the go, twisting and wiggling, being easily excited and having problems keeping seated. Most of the other soft signs stayed the same as being a mild problem, with only one showing an improvement.

Alex's teacher reported that he experienced severe problems on some and mild problems on two of the soft signs of impulsivity during baseline testing. These soft signs included: acting before thinking, fails to take turns or waiting for his turn. Being very impulsive, blurting out answers in class, interrupting conversations and intruding on others. Finding it difficult in waiting for directions to be completed and failing to follow the rules of games were some of the mild problems. During pre-testing all of these soft signs had either disappeared and not experienced as a problem anymore or had improved so that it did not pose severe problems anymore. By the end of the programme none of the soft signs of hyperactivity had shown any improvement.

Alex's teacher reported that he experienced a few severe problems with some of the soft signs of inattention, as well as some milder problems, when evaluating Alex's behaviour during the baseline assessment period. These soft signs which caused severe problems included: poor concentration, poor planning abilities, inattention, short attention span and his difficulty sustaining attention. Some of the soft signs that were seen as milder problems were: failing to finish projects, disorganisation, absentmindedness and inattention and his difficulty following directions, staying on task and completing tasks. By the time pre-testing was done none of these soft signs features and according to the teacher no problems were evident with any. Some deterioration did however set in during the programme, or it might be just because the new teacher was now getting to know all his learners that all the values calculated by the teacher returned to the exact same values that were found on baseline inattention resources.

The ADHDT results by the teacher at the end of the study showed mixed results over time. Although some of the soft signs of inattentiveness did not pose a problem before it became a problem and some of the signs of impulsivity did improve.

Research Question Three

3. Will a “Perceptual- motor” programme have a positive impact on the behavioural characteristics of children who show signs of ADHD, based on improvements of their behavioural soft signs (hyperactivity, impulsivity and inattention) as reported by their parents?

Nadia

Yes. Changes in ADHDT results for Nadia submitted by the parent showed reductions in the severity of the soft signs on the ADHDT were not matched by the reports submitted by the teacher over the same 12-week period. Nadia’s mother reported several changes on the soft signs of hyperactivity during the duration of the programme. During the initial testing she indicated that Nadia had severe problems with being loud, twisting and wiggling in her seat, grabbing objects and excessive talking. Her mother found that they had mild problems with Nadia constantly manipulating objects, fidgeting, being restless and squirming and Nadia being easily excited. During pre- and post-testing she indicted that the problems with being loud, twisting and wiggling in her seat, grabbing objects and excessive talking; where not as severe any more but still lead to mild problems.

During pre-testing her mother had mild problems with Nadia being constantly on the go, but by the end of the programme during post-testing this was not a problem any more. Problems with Nadia constantly manipulating objects, fidgeting and squirming, improved by the date of pre-testing and showed to be no problem by the end of the programme. Nadia did however still show problems with being restless during the duration of the programme.

Nadia did not show any major deterioration during post-testing according to her mother. During pre-testing her mother had indicated that these soft signs

where not as severe any more and found that they were having only mild problems with these elements. By the end of the programme she indicated that they had no more problems with soft signs like failing to take turns and failing to wait turns, impulsivity and Nadia's ability to follow the rules of games. During post-testing she indicted that the problems with Nadia acting before thinking, blurting out answers, intruding on others and interrupting others and inability to wait for directions; where not as severe any more but still lead to mild problems. Nadia did not show any major deterioration during post-testing according to her mother.

Nadia's mother reported several changes on the soft signs of inattention during the duration of the programme. During the initial testing she indicated that Nadia had severe problem with Nadia having poor concentration, failing to finish projects, disorganised, poor planning ability, absentmindedness and inattention. Nadia had severe problems following directions, a short attention span, is easily distracted and difficulty with sustaining attention. She also indicated severe problems with Nadia frequently losing things, difficulty sustaining on task and completing tasks. During pre- and post-testing she indicted that the problems with poor concentration, failing to finish projects, disorganised, poor planning ability, absentmindedness and inattention, following directions, short attention span, distractibility, difficulty with sustaining attention, frequently losing things, difficulty staying on task and completing tasks; where not as severe any more but still lead to mild problems. By the end of the programme they had no more problems with Nadia's ability to following directions or her frequently losing things. Nadia did however still show problems with the rest of the soft signs of inattention according to her mother bur they were only mild problems. Nadia did not show any major deterioration during post-testing according to her mother.

Arno

Yes. Changes in ADHDT results for Arno submitted by the parent were unable to be calculated because the parent did not submit the results at the end of the study. The parent was contacted several times to which the mother did not reply. In the end the parent was phoned and the researcher was told that she had dislocated her right shoulder earlier on during the programme and was unable to complete the ADHDTs.

Ernie

Yes. Changes in ADHDT results for Ernie submitted by the parent could not be calculated because the parent never submitted the results at the end of the study. The parent was contacted several times to which the mother did not reply. After a few more attempts the mother replied and informed me that they were moving and the envelope with the filled out ADHDTs had been misplaced and never found for reporting.

Greg

Yes. The ADHDT results for Greg by the parent were not received back after the study. The researcher did contact Greg's mother several times and phoned her asking for the envelope containing all the data for ADHDT assessment to be sent to the school. The researcher contacted the school secretary a few times after that and enquired about the data a few times but the researcher never received any feedback from the parents.

Alex

Yes. The ADHDT results for Alex by the parent were never received back after the study. Alex's mother was contacted several times to which she replied that the housekeeper had seen the envelope as something that was past due because it had been folded and crumbled by the toddler in the house and thought that it was time to put it in the bin.

Remarks about the Impact of the Programme

Participation in the Purposeful Play Programme had a positive impact on many of the variables in this study (see Table 13). The motor proficiency of all five children who participated in this study showed significant improvement, according to the BOTMP. The reasons for this improvement are probably an interaction of the following:

- The practice activities provided by the gross motor activities that were the content of the programme were designed to help improve the gross motor and sensory-motor skills of these learners.

- All activities were designed and modified to suit each child's abilities and needs.

- Individualised sessions set the opportunity for in-depth interaction with each child, with focussed attention on learner.

- The methods of presentation, i.e. the cognitive strategies, were child-centred, which would have helped build self-confidence in the children.

Table 13

Summary of the positive changes in motor proficiency and soft signs of ADHD

Variable	Nadia	Arno	Ernie	Greg	Alex
FINE MOTOR PROFICIENCY					
Fine motor precision	Yes				
Fine motor integration	Yes	Yes	Yes	Yes	
Manual dexterity	Yes	Yes	Yes		
GROSS MOTOR PROFICIENCY					
Bilateral coordination	Yes	Yes	Yes	Yes	Yes
Balance				Yes	Yes
Running speed & agility	Yes	Yes	Yes	Yes	Yes
Upper limb coordination	Yes	Yes	Yes		Yes
Strength	Yes	Yes	Yes	Yes	
ADHDT from Teacher					
Hyperactivity		Yes		Yes	Yes
Impulsivity			Yes	Yes	Yes
Inattention		Yes		Yes	Yes
ADHDT from Parent					
Hyperactivity	Yes				
Impulsivity					
Inattention	Yes				

In the review of literature a study completed by Beyer (1999) was mentioned, that determined that boys with ADHD showed significant differences in their motor proficiency scores than boys with LD. In tasks/ areas of bilateral coordination, strength, visual-motor control and upper limb speed and dexterity,

boys with LD performed significantly better than boys with ADHD. The poorer performance by children with ADHD supports research findings that performance in fine motor and timed tasks of motor coordination is significantly inferior in participants with ADHD when compared to participants without disabilities and non-medicated children with ADHD. These findings were reflected in the performances of the learners taking part in this study. The most common problems experienced by all five participants were those tests for bilateral coordination, strength and limb coordination.

There were several areas in which all or most of the participants in this study did show improvements. These include:

- Improvements on the element of strength were achieved although the programme was not a strength training programme. These improvements may be the result of using of the correct technique when the test was later performed; than it was really a result of the improvement on the individuals' physical strength.

- Improvements in running speed and agility were achieved and could probably be the result of the improvement of bilateral coordination and thus a more effective running technique that led to improvement in limb-coordination and thus more coordinated movement performance.

There were several areas in which more than half of the participants in this study did not show improvements. These include:

- Fine motor precision did not improve. The programmes focus was on the improvement of gross motor skills and did not place a huge amount of focus on the development of fine motor skills. Some of the individuals may have improved on elements of fine motor precision and fine motor integration as most of them did also have regular sessions with an occupational therapist. Elements of fine motor precision and integration play a very important role in the school setting and huge amount of focus is placed on these elements throughout the school term, this may have lead to the improvement of these individuals on these individual elements of the BOTMP.

- Balance as tested did not improve. Focus was placed on the static and dynamic balance of the individuals' in areas where broader base balance was needed while in the test battery the test requires balance on a narrower base.

Although the improvement on sensory-motor processing was not measured in a formal way, the researcher did note improvement on some of the elements of sensory-motor processing in some of the skills that were addressed during the programme. The reasons for this improvement are probably an interaction of the following:

- The practice activities provided by the sensory-motor activities that were the content of the programme were designed to help improve the gross motor and sensory-motor skills of these learners.

- All activities were designed and modified to suit each child's abilities and needs.

- Individualised sessions set the opportunity for in-depth interaction with each child, with focussed attention on the learner and training the elements of the sensory system that needed most in each individual case.

- The methods of presentation, i.e. the cognitive strategies, were child-centred, which would have helped build self-confidence in the children.

In the review of literature, a study was reviewed by Solan *et al*. (2007) who found that children who show signs of ADHD often have problems with vestibular function which in turn can be associated with deficits in object recognition, spatial navigation, learning and memory. For example, the increased body sway and postural lean that are characteristic of vestibular disorders can become a physical distraction than can increase challenges to the control of attention.

Remarks about Attentional Skills Improvement

The attentional skills of all five children who participated in this study showed some improvement, according to the teachers involved and journal entries

by the researcher. The reasons for this improvement are probably an interaction of the following:

- The focus practice activities provided by the attentional skills activities that were the content of the programme, was designed to help improve the attentional skills of these learners.
- All activities were designed and modified to suit each child's abilities and needs.
- Individualised sessions set the opportunity for in-depth interaction with each child and training the child's attentional abilities.

The researcher believes that attention is a skill that can be improved over time, placing enough focus and effort into each session, attentional development is a skill that can be improved by these individuals. As any skill can be improved by training; training showing differences in effort, focus and time for all individuals, attention as a skill can be improved by all over time specific to their case.

Recommendations

Future Research

The following recommendations for future research are made based on the experience of conducting this study:

- The baseline period is critical. It is wise to have a period of at least 6 weeks prior to the beginning of the programme to establish baseline values for the individuals involved in the study. ADHD children are at times on a roller coaster ride and it is important to establish a baseline from which to work because some important issues may be overlooked if the child is caught in the middle of a changing cycle.
- The importance of methods used or instructions given for the completion of certain elements contributing to the data collection process should be explained and emphasised to the individuals helping with data gathering, or

from whom data is gathered by means of forms or observations, *e.g.* parents and teachers.

- Vestibular function can be associated with deficits in object recognition, spatial navigation, learning and memory of children with signs of ADHD. Research to examine the development of the vestibular and proprioceptive systems of children with ADHD may be of great value.

- Children with ADHD often have associated problems. It is therefore very important to pursue research that will expand our understanding of how co-morbid factors may interact to influence a child in a negative way. For example, childhood depression may play an important role on the motivation of the child and the way in which they cope with failure.

Future Programmes

The following recommendations for future programmes are made based on the experience of conducting this study:

- It was found that the time allocated (30-minute sessions one time per week) to each child was too little for the effective amount of training in each session because some individuals take longer to learn (acquire) a new skill or activity. Intervention sessions should be at least 40 to 45 minutes for effective practice and then training time (repeating new learned skill); but not more than 55 minutes because these individuals tire quickly.

- The physical activities should take place in a playful and fun manner. There should be enough variation in activities to keep it fun and interesting.

- When planning, use the continuum of difficulty. Do not overwhelm those who struggle, but challenge those who show more skill.

- Individualise programme and activities when working with ADHD children.

- When working with children with ADHD, effective behavioural and teaching strategies are very important to keep them focussed and productive throughout the session.

- Planning and structure are very important elements of success during sessions when working with children with ADHD.

Concluding Remarks

The impact of ADHD on the academic, social and psychomotor performance of children has caused great concern among parents and educators alike. It can be concluded that the Purposeful Play Programme appears to have been helpful for the children who participated in this study. Reducing some of the following limitations that affected this study could contribute to an even more successful effort in the future

- There was a limit on the amount of time allocated to the programme as school activities were still very important during the time of programme. The programme had to run during school hours; it may be best if these types of programmes are done in times allocated out of school periods.

- Not enough time was available during sessions to place more focus on these elements as the sessions took place within a time limit, regulated by external bodies.

- Some valuable information may have been lost in the process of data gathering as some of the parent's hectic lifestyles took over and not all of the data could be gathered at the end of the programme. The researcher did try and collect all relevant information to broaden the data and get more in-depth scope on all relevant factors of sensory-motor improvement on the children but the parents were unfortunately unable to deliver.

Early intervention is very important if we want to help those who need it, as it was stated earlier in this study. Acronstam (2003) proposed that there is a need for different professions to establish their own fields of specialisation. Then, there should be a "cross over" to other disciplines in order to operate in a multidisciplinary manner. The multidisciplinary approach that was suggested seems to be the ideal if we want to help children with ADHD. They are whole human beings, deserving a holistic approach to intervention.

ADHD should be seen as a multidimensional disorder consisting of interacting neurological, genetic and psychosocial causal factors (Harvey & Reid, 2003). Multimodal treatment approaches are recommended for persons with ADHD because there is not one definitive cause of the disorder and co-morbidity is so frequent. As with other chronic conditions, treatment of ADHD requires the development of child-specific treatment plans that describe methods and goals of treatment and means of monitoring care over time, including specific plans for the follow-up.

Finally, the researcher cannot stress the importance of the following fact enough. Children with ADHD should be treated within a holistic approach, supported by parents, teachers and other professional in a child-specific treatment; in an early as possible intervention and management programme to control the impact of ADHD on the individuals' life.

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Appendix A- Case Study One

SIGNATURE OF RESEARCH SUBJECT OR LEGAL REPRESENTATIVE

The information above was provided to me by Ingha Rathbone in English and Afrikaans at a group meeting of parents of potential participants in this study. I am in command of one or both of these languages. We were given the opportunity to ask questions and these questions were answered to my satisfaction.

I hereby consent to allow my child to be given the opportunity to participate in this study, if he/she would like to do so after hearing a presentation made individually to him/her about the programme from Ingha Rathbone.

Nadine Hoogenboezem

Name of Child

Carmen Hoogenboezem

Name of Parent or Legal Representative

Hoogenboezem 29/5/08

Signature of Parent or Legal Representative **Date**

SIGNATURE OF CHILD

I would like to join the physical activity programme that Miss Rathbone described to me.

Nadine 30/5/08

Signature of Child **Date**

SIGNATURE OF INVESTIGATOR

I declare that I explained the information given in this document to Carmen Hoogenboezem (name of parent or legal representative) at a group session with the parents of all potential participants. He/she was encouraged and given ample time to ask me any questions. This presentation was conducted in English and in Afrikaans. If the parents/legal representative was positive about his/her child's participation, they were asked to sign the consent form above.

I then spoke individually with each of the children whose parent/legal representative had indicated that they wanted their child to have the opportunity to participate in the physical activity programme. During this conversation in either English or Afrikaans (depending on the chillds' preference), I encouraged him/her to ask me questions. I asked at the end of the conversation if the child wanted to volunteer to join the programme. If the answer was affirmative, I asked the child to sign the consent form above

Signature of Investigator

30 - 05 - 08

Date

Nadine Hoogenboezem (Gr 1)
12/06/08

SHORTForm

Subtest 1: Fine Motor Precision

	Raw Score	Raw	≥21	15–20	10–14	6–9	4–5	2–3	1	0	Point Score
3 Drawing Lines through Paths—Crooked	0 errors	Point	0	1	2	3	4	5	6	7	7

	Raw Score	Raw	0	1–2	3–4	5–6	7–8	9–10	11	12	Point Score
6 Folding Paper	2 points	Point	0	1	2	3	4	5	6	7	1

Subtest 2: Fine Motor Integration

	Basic Shape	Closure	Edges	Orientation	Overlap	Overall Size	Raw Score*	Point Score
2 Copying a Square	0 (1)	(0) 1	(0) 1	0 (1)		0 (1)	3 points	3
7 Copying a Star	(0) 1	(0) 1	(0) 1	(0) 1		(0) 1	0 points	0

Subtest 3: Manual Dexterity

	Raw Score Trial 1	Raw Score Trial 2	Raw	0–2	3–4	5–6	7–8	9–10	11–12	13–14	15–16	17–18	19–20	Point Score
Transferring Pennies (15 sec)	7 pennies	7 pennies	Point	0	1	2	3	4	5	6	7	8	9	3

Subtest 4: Bilateral Coordination

	Raw Score Trial 1	Raw Score Trial 2	Raw	0	1	2–4	5	Point Score
3 Jumping in Place—Same Sides Synchronized	1 jumps	1 jumps	Point	0	1	2	3	1

	Raw Score Trial 1	Raw Score Trial 2	Raw	0	1	2–4	5–9	10	Point Score
6 Tapping Feet and Fingers—Same Sides Synchronized	3 taps	3 taps	Point	0	1	2	3	4	2

Subtest 5: Balance

	Raw Score Trial 1	Raw Score Trial 2	Raw	0	1–2	3–4	5	6	Point Score
2 Walking Forward on a Line	6 steps	steps	Point	0	1	2	3	4	4

	Raw Score Trial 1	Raw Score Trial 2	Raw	0.0–0.9	1.0–2.9	3.0–5.9	6.0–9.9	10	Point Score
7 Standing on One Leg on a Balance Beam—Eyes Open (10 sec)	2.06 seconds	2.06 seconds	Point	0	1	2	3	4	1

Subtest 6: Running Speed and Agility

	Raw Score Trial 1	Raw Score Trial 2	Raw	0	1–2	3–5	6–9	10–14	15–19	20–24	25–29	30–39	40–49	≥50	Point Score
One-Legged Stationary Hop (15 sec)	5 hops	15 hops	Point	0	1	2	3	4	5	6	7	8	9	10	5

Subtest 7: Upper-Limb Coordination

	Raw Score Trial 1	Raw Score Trial 2	Raw	0	1	2	3	4	5	Point Score
1 Dropping and Catching a Ball—Both Hands	0 catches		Point	0	1	2	3	4	5	0

	Raw Score Trial 1	Raw Score Trial 2	Raw	0	1	2	3	4–5	6–7	8–9	10	Point Score
6 Dribbling a Ball—Alternating Hands	0 dribbles	0 dribbles	Point	0	1	2	3	4	5	6	7	0

Subtest 8: Strength

	Raw Score	Raw	0	1–2	3–5	6–10	11–15	16–20	21–25	26–30	31–35	≥36	Point Score
2a Knee Push-ups OR (circle one) 2b Full Push-ups (30 sec)	5 push-ups	Point	0	1	2	3	4	5	6	7	8	9	2

	Raw Score	Raw	0	1–2	3–5	6–10	11–15	16–20	21–25	26–30	31–35	≥36	Point Score
3 Sit-ups (30 sec)	10 sit-ups	Point	0	1	2	3	4	5	6	7	8	9	3

Notes & Observations

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Total Point Score Short Form (max = 88)

* For Subtest 2: Fine Motor Integration, add the facet scores, record the sum in the Raw Score column, and transfer the raw score for each item directly to the corresponding oval in the Point Score column.

Nadine Hoogenboezem
22/07/08

SHORTForm

Subtest 1: **Fine Motor Precision**	Raw Score									Point Score
3 Drawing Lines through Paths—Crooked	errors	Raw	≥21	15–20	10–14	6–9	4–5	2–3	1	0	3
		Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
6 Folding Paper	points	Raw	0	1–2	3–4	5–6	7–8	9–10	11	12	2
		Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	

Subtest 2: **Fine Motor Integration**	Basic Shape	Closure	Edges	Orientation	Overlap	Overall Size	Raw Score*	Point Score
2 Copying a Square	0 1	0 1	0 1	0 1		0 1	3 points	3
7 Copying a Star	0 1	0 1	0 1	0 1		0 1	3 points	3

Subtest 3: **Manual Dexterity**	Raw Score Trial 1	Raw Score Trial 2											Point Score
3 Transferring Pennies (15 sec)	7 pennies	5 pennies	Raw	0–2	3–4	5–6	7–8	9–10	11–12	13–14	15–16	17–18	19–20	3
			Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	

Subtest 4: **Bilateral Coordination**	Raw Score Trial 1	Raw Score Trial 2						Point Score
3 Jumping in Place—Same Sides Synchronized	0 jumps	0 jumps	Raw	0	1	2–4	5	0
			Point	**0**	**1**	**2**	**3**	
6 Tapping Feet and Fingers—Same Sides Synchronized	10 taps	taps	Raw	0	1	2–4	5–9	10	4
			Point	**0**	**1**	**2**	**3**	**4**	

Subtest 5: **Balance**	Raw Score Trial 1	Raw Score Trial 2							Point Score
2 Walking Forward on a Line	6 steps	4 steps	Raw	0	1–2	3–4	5	6	4
			Point	**0**	**1**	**2**	**3**	**4**	
7 Standing on One Leg on a Balance Beam—Eyes Open (10 sec)	5 seconds	2 seconds	Raw	0.0–0.9	1.0–2.9	3.0–5.9	6.0–9.9	10	2
			Point	**0**	**1**	**2**	**3**	**4**	

Subtest 6: **Running Speed and Agility**	Raw Score Trial 1	Raw Score Trial 2												Point Score
3 One-Legged Stationary Hop (15 sec)	4 hops	5 hops	Raw	0	1–2	3–5	6–9	10–14	15–19	20–24	25–29	30–39	40–49	≥50	2
			Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	

Subtest 7: **Upper-Limb Coordination**	Raw Score Trial 1	Raw Score Trial 2									Point Score
1 Dropping and Catching a Ball—Both Hands	2 catches		Raw	0	1	2	3	4	5		2
			Point	**0**	**1**	**2**	**3**	**4**	**5**		
6 Dribbling a Ball—Alternating Hands	2 dribbles	3 dribbles	Raw	0	1	2	3	4–5	6–7	8–9	10	3
			Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	

Subtest 8: **Strength**	Raw Score											Point Score
2a Knee Push-ups OR (circle one) 2b Full Push-ups (30 sec)	7 push-ups	Raw	0	1–2	3–5	6–10	11–15	16–20	21–25	26–30	31–35	≥36	3
		Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	
3 Sit-ups (30 sec)	4 sit-ups	Raw	0	1–2	3–5	6–10	11–15	16–20	21–25	26–30	31–35	≥36	2
		Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	

Notes & Observations

36

Total Point Score Short Form (max = 88)

* For Subtest 2: Fine Motor Integration, add the facet scores, record the sum in the Raw Score column, and transfer the raw score for each item directly to the corresponding oval in the Point Score column.

Nadine
09-09-08

SHORTForm

Subtest 1: Fine Motor Precision

	Raw Score									Point Score
3 Drawing Lines through Paths—Crooked	0 errors	Raw	≥21	15–20	10–14	6–9	4–5	2–3	1	0	7
		Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
6 Folding Paper	2 points	Raw	0	1–2	3–4	5–6	7–8	9–10	11	12	1
		Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	

Subtest 2: Fine Motor Integration

	Basic Shape	Closure	Edges	Orientation	Overlap	Overall Size	Raw Score*	Point Score
2 Copying a Square	0 1	0 1	0 1	0 1		0 1	5 points	5
7 Copying a Star	0 1	0 1	0 1	0 1		0 1	3 points	3

Subtest 3: Manual Dexterity

	Raw Score Trial 1	Raw Score Trial 2											
2 Transferring Pennies (15 sec)	8 pennies	10 pennies	Raw	0–2	3–4	5–6	7–8	9–10	11–12	13–14	15–16	17–18	19–20	4
			Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	

Subtest 4: Bilateral Coordination

	Raw Score Trial 1	Raw Score Trial 2							
3 Jumping in Place—Same Sides Synchronized	3 jumps	5 jumps	Raw	0	1	2–4	5		3
			Point	**0**	**1**	**2**	**3**		
6 Tapping Feet and Fingers—Same Sides Synchronized	8 taps	10 taps	Raw	0	1	2–4	5–9	10	4
			Point	**0**	**1**	**2**	**3**	**4**	

Subtest 5: Balance

	Raw Score Trial 1	Raw Score Trial 2							
2 Walking Forward on a Line	6 steps	6 steps	Raw	0	1–2	3–4	5	6	4
			Point	**0**	**1**	**2**	**3**	**4**	
7 Standing on One Leg on a Balance Beam—Eyes Open (10 sec)	3 seconds	5 seconds	Raw	0.0–0.9	1.0–2.9	3.0–5.9	6.0–9.9	10	2
			Point	**0**	**1**	**2**	**3**	**4**	

Subtest 6: Running Speed and Agility

	Raw Score Trial 1	Raw Score Trial 2											
3 One-Legged Stationary Hop (15 sec)	15 hops	13 hops	Raw	0	1–2	3–5	6–9	10–14	15–19	20–24	25–29	30–39	40–49	≥50	5
			Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	

Subtest 7: Upper-Limb Coordination

	Raw Score Trial 1	Raw Score Trial 2									
1 Dropping and Catching a Ball—Both Hands	5 catches		Raw	0	1	2	3	4	5		5
			Point	**0**	**1**	**2**	**3**	**4**	**5**		
6 Dribbling a Ball—Alternating Hands	3 dribbles	3 dribbles	Raw	0	1	2	3	4–5	6–7	8–9	10	3
			Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	

Subtest 8: Strength

	Raw Score											Point Score
2a Knee Push-ups OR (circle one) **2b** Full Push-ups (30 sec)	5 push-ups	Raw	0	1–2	3–5	6–10	11–15	16–20	21–25	26–30	31–35	≥36	2
		Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	
3 Sit-ups (30 sec)	15 sit-ups	Raw	0	1–2	3–5	6–10	11–15	16–20	21–25	26–30	31–35	≥36	4
		Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	

Notes & Observations

52
Total Point Score
Short Form
(max = 88)

* For Subtest 2: Fine Motor Integration, add the face scores, record the sum and transfer the raw score for each item directly to the corresponding oval in the Point Score column.

Name :	Age:	Facility/ Location:	Date:
① Nadine	7	Indoors/Staff Room	24 - 07 - 2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
☑ Learn to control distractibility □ Learn to control visual tracking □ Learn to control time-on-task □ Learn to use short-term memory □ Learn to discriminate among cues, signals, objects, people in the environment	☑ Body Awareness ☑ Vestibular ☑ Proprioceptive □ Visual □ Auditory □ Tactile	☑ Verbal cues/ motivation ☑ Visual and Auditory cues ☑ Demonstrations □ Mental pre-set □ Maintain concentrations □ Attentional switching □ Organization □ Frequent/ immediate feedback □ Individualized activities * Repitition	□ Positive reinforcement □ Response cost □ Token economy ☑ Reduce external distractions □

Activities	Individualized activities and homework
➢ Static balance on ball- proper form on ball ➢ Dynamic Balance- moving hips and arms ➢ Assisted push-up on ball and floor ➢ Tabletop- Balance ➢ Walking out with Ball ➢ Bridging Rhythm and Dance- tapping bodyparts and hopping on ball	* "Bridge" * Jumping in blocks + tile-tile * Double - Single Foot
Comment: Focus was to learn "inner" distractibility. Extremely weak core. Vestibular + Proprioceptive overstimulation. Struggles to keep focused. Good sense of "self" (body awareness) distractibility makes completion of tasks difficult	

Name :	Age:	Facility/ Location:	Date:
② Nadine	7	Outdoors	05-08-2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
□ Learn to control distractibility ☑ Learn to control visual tracking □ Learn to control time-on-task □ Learn to use short-term memory □ Learn to discriminate among cues, signals, objects, people in the environment	☑ Body Awareness □ Vestibular ☑ Proprioceptive ☑ Visual □ Auditory □ Tactile	☑ Verbal cues/ motivation ☑ Visual and Auditory cues □ Demonstrations □ Mental pre-set □ Maintain concentrations □ Attentional switching □ Organization □ Frequent/ immediate feedback □ Individualized activities	☑ Positive reinforcement □ Response cost □ Token economy □ Reduce external distractions □

Activities	Individualized activities and homework
② Following moving objects with eyes, without moving head- ball on a string and flash light. ② Learning to juggle with 2 beanbags and later tennis balls ② Manipulating ball @ own pace through beacons x1 ② Dribble with foot and hand Not done ② Throw and catch without partner and with partner ② Spatial inclusion- using auditive as well, partner stands behind person bouncing ball to left, right or over head. Person has to be ready to swivel and move to catch ball before second bounce. Ball and bucket- person is ready to catch ball with bucket- ball can be thrown through air or bounced. Person must catch ball before second bounce.	* modified juggle * Throwing wall (one-hand)
Comment: * Hand + Foot = Big Ball * Problems with visual tracking (eyes do not follow at all * easily irritated = weather. Hfpels to EVERYTHING! restless, wiggling squirming. Tugging @ clothes	

Name :	Age:	Facility/ Location:	Date:
(5) Nadine	7	Outdoors	12-08-2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
□ Learn to control distractibility □ Learn to control visual tracking □ Learn to control time-on-task ☑ Learn to use short-term memory □ Learn to discriminate among cues, signals, objects, people in the environment	☑ Body Awareness □ Vestibular ☑ Proprioceptive □ Visual □ Auditory □ Tactile	☑ Verbal cues/ motivation ☑ Visual and Auditory cues □ Demonstrations □ Mental pre-set □ Maintain concentrations □ Attentional switching □ Organization ☑ Frequent/ immediate feedback □ Individualized activities * Repitition * encouragement	☑ Positive reinforcement □ Response cost □ Token economy □ Reduce external distractions □

Activities	Individualized activities and homework
➢ Simon Says + Memory Card game ➢ What did i spell ➢ Shifting beanbags- midline crossing ➢ Clapping game- body parts and memory sequencing e.g. 1 clap= touch nose, 2 claps= jump in air, 3 claps= touch left knee, 4 claps= turn 360 degrees ➢ Moving different directions and intensities ➢ Jumping on dots- directions ➢ Braingym activities on wall Tasks while standing on bozu ball	*memory games
Comment: * Memory Seq problem = 1st + last, 2nd/middle problem * Struggle on Bozu ball * very distracted, easily distracted by everything mindete. * Crying = flower picking session over	* Previous Homework not done

Name :	Age:	Facility/ Location:	Date:
Nadine	7	Outdoors	19-08-2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
□ Learn to control distractibility □ Learn to control visual tracking ☑ Learn to control time-on-task □ Learn to use short-term memory □ Learn to discriminate among cues, signals, objects, people in the environment	□ Body Awareness □ Vestibular □ Proprioceptive □ Visual ☑ Auditory □ Tactile	☑ Verbal cues/ motivation □ Visual and Auditory cues □ Demonstrations ☑ Mental pre-set □ Maintain concentrations □ Attentional switching □ Organization ☑ Frequent/ immediate feedback ☑ Individualized activities * Encouragement	□ Positive reinforcement □ Response cost □ Token economy □ Reduce external distractions □

Activities	Individualized activities and homework
➢ Obstacle- how will you go about overcoming obstacle-think and tell and then act...rethink and act. ➢ Swopping balls into same colors- rules to game. Thing, tell and do. ➢ Task at hand... how will you solve task... tactile and aditory- grouping and memorizing ➢ Goodie bag = tactile	No- Homework Parent in Europe
Comment: * Stays on track and more focussed by telling me step by step what to do ... * Takes too much time - to thorough @ tasks Focus on detail = problem	

Name :	Age:	Facility/ Location:	Date:
(5) Nadine	7	Outdoors (Steep)	26-08-2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
☑ Learn to control distractibility ☐ Learn to control visual tracking ☐ Learn to control time-on-task ☐ Learn to use short-term memory ☑ Learn to discriminate among cues, signals, objects, people in the environment	☐ Body Awareness ☐ Vestibular ☑ Proprioceptive ☑ Visual ☐ Auditory ☐ Tactile	☑ Verbal cues/ motivation (MS) struggled ☐ Visual and Auditory cues ☑ Demonstrations ☐ Mental pre-set ☐ Maintain concentrations ☑ Attentional switching (Refocus) ☐ Organization ☐ Frequent/ immediate feedback ☐ Individualized activities * eye contact (nh)	☐ Positive reinforcement ☐ Response cost ☐ Token economy ☐ Reduce external distractions ☐

Activities	Individualized activities and homework
➢ Throwing @ targets on wall ➢ Throwing into bucket and different obstacles on ground ➢ Throwing @ cones disregard other colors- only concentrating on colors called out ➢ Rolling balls @ different targets ➢ Kicking ball @ differnt targets ➢ Hoop vs Bucket ➢ Variety with different instructions	Start with little distractions and add as person can disregard more distractions
Comment: * Teacher informed problems in class = medication? * Rigid + immature moving (locomotion), especially throwing? ⇨ could do these * anxiety + emotional = parents gone? * Struggles = knows it, demotivated	

Appendix B- Case Study Two

SIGNATURE OF RESEARCH SUBJECT OR LEGAL REPRESENTATIVE

The information above was provided to me by Ingha Rathbone in English and Afrikaans at a group meeting of parents of potential participants in this study. I am in command of one or both of these languages. We were given the opportunity to ask questions and these questions were answered to my satisfaction.

I hereby consent to allow my child to be given the opportunity to participate in this study, if he/she would like to do so after hearing a presentation made individually to him/her about the programme from Ingha Rathbone.

André Coppoolse. Grade 1 2008.

Name of Child

Mrs Michelle Coppoolse.

Name of Parent or Legal Representative

M Coppoolse. 21/5/2008

Signature of Parent or Legal Representative **Date**

SIGNATURE OF CHILD

I would like to join the physical activity programme that Miss Rathbone described to me.

André 21/05/2008

Signature of Child **Date**

- André received OT + Speech for 3 years, 2008 This being 4th year.
- Mondays Speech 1-2pm.
- Thursdays OT 1-2pm.
- On Meds: 30mg LA Ritalin (long acting (12 hours)) morning.
  25mg Strattera Evening.
  0.7mg Risperdal x2 day for ODD + OCD.
  Has ADHD with Borderline Autism Aspergers (High Functioning)
- Please note overleaf: P.T.O.

SIGNATURE OF INVESTIGATOR

I declare that I explained the information given in this document to Michelle Carpoolse (name of parent or legal representative) at a group session with the parents of all potential participants. He/she was encouraged and given ample time to ask me any questions. This presentation was conducted in English and in Afrikaans. If the parents/legal representative was positive about his/her child's participation, they were asked to sign the consent form above.

I then spoke individually with each of the children whose parent/legal representative had indicated that they wanted their child to have the opportunity to participate in the physical activity programme. During this conversation in either English or Afrikaans (depending on the chillds' preference), I encouraged him/her to ask me questions. I asked at the end of the conversation if the child wanted to volunteer to join the programme. If the answer was affirmative, I asked the child to sign the consent form above

Signature of Investigator

21-05-2008

Date

André Coppoolse (Gr 1)
12/06/08

SHORTForm

Subtest 1: **Fine Motor Precision**	Raw Score									Point Score
3 Drawing Lines through Paths—Crooked	0 errors	Raw	≥21	15–20	10–14	6–9	4–5	2–3	1	0	7
		Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
6 Folding Paper	7 points	Raw	0	1–2	3–4	5–6	7–8	9–10	11	12	4
		Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	

Subtest 2: **Fine Motor Integration**	Basic Shape	Closure	Edges	Orientation	Overlap	Overall Size	Raw Score*	Point Score
2 Copying a Square	0 (1)	0 (1)	0 (1)	0 (1)		0 (1)	5 points	5
7 Copying a Star	(0) 1	(0) 1	(0) 1	0 (1)		0 (1)	2 points	2

Subtest 3: **Manual Dexterity**	Raw Score Trial 1	Raw Score Trial 2											Point Score
Transferring Pennies (15 sec)	3 pennies	6 pennies	Raw	0–2	3–4	5–6	7–8	9–10	11–12	13–14	15–16	17–18	19–20	2
			Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	

Subtest 4: **Bilateral Coordination**	Raw Score Trial 1	Raw Score Trial 2						Point Score
3 Jumping in Place—Same Sides Synchronized	0 jumps	0 jumps	Raw	0	1	2–4	5	0
			Point	**0**	**1**	**2**	**3**	
6 Tapping Feet and Fingers—Same Sides Synchronized	4 taps	5 taps	Raw	0	1	2–4	5–9	10	3
			Point	**0**	**1**	**2**	**3**	**4**	

Subtest 5: **Balance**	Raw Score Trial 1	Raw Score Trial 2							Point Score
2 Walking Forward on a Line	6 steps	steps	Raw	0	1–2	3–4	5	6	4
			Point	**0**	**1**	**2**	**3**	**4**	
7 Standing on One Leg on a Balance Beam—Eyes Open (10 sec)	1.94 seconds	1 seconds	Raw	0.0–0.9	1.0–2.9	3.0–5.9	6.0–9.9	10	1
			Point	**0**	**1**	**2**	**3**	**4**	

Subtest 6: **Running Speed and Agility**	Raw Score Trial 1	Raw Score Trial 2												Point Score
One-Legged Stationary Hop (15 sec)	0 hops	2 hops	Raw	0	1–2	3–5	6–9	10–14	15–19	20–24	25–29	30–39	40–49	≥50	1
			Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	

Subtest 7: **Upper-Limb Coordination**	Raw Score Trial 1	Raw Score Trial 2								Point Score
1 Dropping and Catching a Ball—Both Hands	4 catches		Raw	0	1	2	3	4	5	4
			Point	**0**	**1**	**2**	**3**	**4**	**5**	
6 Dribbling a Ball—Alternating Hands	4 dribbles	9 dribbles	Raw	0	1	2	3	4–5	6–7	8–9	10	6
			Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	

Subtest 8: **Strength**	Raw Score												Point Score
2a Knee Push-ups **OR** (circle one) **2b** Full Push-ups (30 sec)	0 push-ups	Raw	0	1–2	3–5	6–10	11–15	16–20	21–25	26–30	31–35	≥36	0
		Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	
3 Sit-ups (30 sec)	8 sit-ups	Raw	0	1–2	3–5	6–10	11–15	16–20	21–25	26–30	31–35	≥36	3
		Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	

Notes & Observations

42
Total Point Score Short Form (max = 88)

* For Subtest 2: Fine Motor Integration, add the facet scores, record the sum in the Raw Score column, and transfer the raw score for each item directly to the corresponding oval in the Point Score column.

André Coppolse
22/07/08

SHORTForm

Subtest 1: Fine Motor Precision

	Raw Score	Raw	≥21	15–20	10–14	6–9	4–5	2–3	1	0	Point Score
3 Drawing Lines through Paths—Crooked	errors	Point	0	1	2	3	(4)	5	6	7	4
6 Folding Paper	points	Raw	0	1–2	3–4	5–6	7–8	9–10	11	12	1
		Point	0	(1)	2	3	4	5	6	7	

Subtest 2: Fine Motor Integration

	Basic Shape	Closure	Edges	Orientation	Overlap	Overall Size	Raw Score*	Point Score
2 Copying a Square	0 (1)	0 (1)	(0) 1	0 (1)		0 (1)	4 points	4
7 Copying a Star	0 (1)	0 1	(0) 1	0 (1)		0 (1)	3 points	3

Subtest 3: Manual Dexterity

	Raw Score Trial 1	Raw Score Trial 2	Raw	0–2	3–4	5–6	7–8	9–10	11–12	13–14	15–16	17–18	19–20	Point Score
Transferring Pennies (15 sec)	6 pennies	10 pennies	Point	0	1	2	3	(4)	5	6	7	8	9	4

Subtest 4: Bilateral Coordination

	Raw Score Trial 1	Raw Score Trial 2	Raw	0	1	2–4	5	5–9	10	Point Score
3 Jumping in Place—Same Sides Synchronized	2 jumps	3 jumps	Point	0	1	(2)	3			2
6 Tapping Feet and Fingers—Same Sides Synchronized	8 taps	7 taps	Point	0	1	2		(3)	4	3

Subtest 5: Balance

	Raw Score Trial 1	Raw Score Trial 2	Raw	0	1–2	3–4	5	6	0.0–0.9	1.0–2.9	3.0–5.9	6.0–9.9	10	Point Score
2 Walking Forward on a Line	6 steps	6 steps	Point	0	1	2	3	(4)						4
7 Standing on One Leg on a Balance Beam—Eyes Open (10 sec)	~~50~~ seconds	~~40~~ seconds	Point						0	1	(2)	3	4	2

Subtest 6: Running Speed and Agility

	Raw Score Trial 1	Raw Score Trial 2	Raw	0	1–2	3–5	6–9	10–14	15–19	20–24	25–29	30–39	40–49	≥50	Point Score
One-Legged Stationary Hop (15 sec)	5 hops	4 hops	Point	0	1	(2)	3	4	5	6	7	8	9	10	2

Subtest 7: Upper-Limb Coordination

	Raw Score Trial 1	Raw Score Trial 2	Raw	0	1	2	3	4	5	6–7	8–9	10	Point Score
1 Dropping and Catching a Ball—Both Hands	5 catches		Point	0	1	2	3	4	(5)				5
6 Dribbling a Ball—Alternating Hands	6 dribbles	6 dribbles	Point	0	1	2	3	4		(5)	6	7	5

Subtest 8: Strength

	Raw Score	Raw	0	1–2	3–5	6–10	11–15	16–20	21–25	26–30	31–35	≥36	Point Score
2a Knee Push-ups OR (circle one) 2b Full Push-ups (30 sec)	5 push-ups	Point	0	1	(2)	3	4	5	6	7	8	9	2
3 Sit-ups (30 sec)	10 sit-ups	Point	0	1	2	(3)	4	5	6	7	8	9	3

Notes & Observations

44

Total Point Score
Short Form
(max = 88)

* For Subtest 2: Fine Motor Integration, add the facet scores, record the sum in the Raw Score column, and transfer the raw score for each item directly to the corresponding oval in the Point Score column.

Andre
04-09-08

SHORTForm

Subtest 1: Fine Motor Precision

	Raw Score									Point Score
3 Drawing Lines through Paths—Crooked	2 errors	Raw	≥21	15–20	10–14	6–9	4–5	2–3	1	0	5
		Point	0	1	2	3	4	5	6	7	
6 Folding Paper	2 points	Raw	0	1–2	3–4	5–6	7–8	9–10	11	12	1
		Point	0	1	2	3	4	5	6	7	

Subtest 2: Fine Motor Integration

	Basic Shape	Closure	Edges	Orientation	Overlap	Overall Size	Raw Score*	Point Score
2 Copying a Square	0 1	0 1	0 1	0 1		0 1	5 points	5
7 Copying a Star	0 1	0 1	0 1	0 1		0 1	3 points	3

Subtest 3: Manual Dexterity

	Raw Score Trial 1	Raw Score Trial 2											Point Score
2 Transferring Pennies (15 sec)	8 pennies	13 pennies	Raw	0–2	3–4	5–6	7–8	9–10	11–12	13–14	15–16	17–18	19–20	6
			Point	0	1	2	3	4	5	6	7	8	9	

Subtest 4: Bilateral Coordination

	Raw Score Trial 1	Raw Score Trial 2							Point Score
3 Jumping in Place—Same Sides Synchronized	2 jumps	5 jumps	Raw	0	1	2–4	5		3
			Point	0	1	2	3		
6 Tapping Feet and Fingers—Same Sides Synchronized	taps	10 taps	Raw	0	1	2–4	5–9	10	4
			Point	0	1	2	3	4	

Subtest 5: Balance

	Raw Score Trial 1	Raw Score Trial 2							Point Score
2 Walking Forward on a Line	steps	6 steps	Raw	0	1–2	3–4	5	6	4
			Point	0	1	2	3	4	
7 Standing on One Leg on a Balance Beam—Eyes Open (10 sec)	4 seconds	5 seconds	Raw	0.0–0.9	1.0–2.9	3.0–5.9	6.0–9.9	10	2
			Point	0	1	2	3	4	

Subtest 6: Running Speed and Agility

	Raw Score Trial 1	Raw Score Trial 2											Point Score
3 One-Legged Stationary Hop (15 sec)	20 hops	25 hops	Raw	0	1–2	3–5	6–9	10–14	15–19	20–24	25–29	30–39	40–49	≥50	7
			Point	0	1	2	3	4	5	6	7	8	9	10	

Subtest 7: Upper-Limb Coordination

	Raw Score Trial 1	Raw Score Trial 2								Point Score
1 Dropping and Catching a Ball—Both Hands	5 catches		Raw	0	1	2	3	4	5	5
			Point	0	1	2	3	4	5	
6 Dribbling a Ball—Alternating Hands	8 dribbles	10 dribbles	Raw	0	1	2	3	4–5	6–7	8–9	10	7
			Point	0	1	2	3	4	5	6	7	

Subtest 8: Strength

	Raw Score											Point Score
2a Knee Push-ups OR (circle one) **2b** Full Push-ups (30 sec)	10 push-ups	Raw	0	1–2	3–5	6–10	11–15	16–20	21–25	26–30	31–35	≥36	3
		Point	0	1	2	3	4	5	6	7	8	9	
3 Sit-ups (30 sec)	15 sit-ups	Raw	0	1–2	3–5	6–10	11–15	16–20	21–25	26–30	31–35	≥36	4
		Point	0	1	2	3	4	5	6	7	8	9	

Notes & Observations

59

Total Point Score Short Form (max = 88)

* For Subtest 2: Fine Motor Integration, add the facet scores, record the sum in the Raw Score column, and transfer the raw score for each item directly to the corresponding oval in the Point Score column.

Name :	Age:	Facility/ Location:	Date:
① André	7	Indoors /Staff Room	29-07-2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
☑ Learn to control distractibility ☐ Learn to control visual tracking ☐ Learn to control time-on-task ☐ Learn to use short-term memory ☐ Learn to discriminate among cues, signals, objects, people in the environment	☐ Body Awareness ☑ Vestibular ☑ Proprioceptive ☐ Visual ☐ Auditory ☐ Tactile	☑ Verbal cues/ motivation ☑ Visual and Auditory cues ☑ Demonstrations ☐ Mental pre-set ☐ Maintain concentration ☐ Attentional switching ☐ Organization ☑ Frequent/ immediate feedback ☐ Individualized activities * eye contact nb * repetition	☑ Positive reinforcement ☐ Response cost ☐ Token economy ☐ Reduce external distractions ☐

Activities	Individualized activities and homework
➢ Static balance on ball- proper form on ball (very unstable) ➢ Dynamic Balance- moving hips and arms ➢ Assisted push-up on ball and floor major problems ➢ Tabletop- Balance ➢ Walking out with Ball ➢ Bridging Rhythm and Dance- tapping bodyparts and hopping on ball + ➢ locomotion + bean bags walk like: worm, bunny, crawl etc.	* Bridge * Jumping in blocks ↓ double foot (NB) ↳ slow (fast) one-leg

Comment:
* Extremely weak in core = ball rolling side to side under bum
* Refers to body as the machine? Excessive talking
* Good sense of "self"
* Refocus * huge problems very easily distracted

Name :	Age:	Facility/ Location:	Date:
(2) Andie	7	Outdoors	05-08-2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
□ Learn to control distractibility ☑ Learn to control visual tracking □ Learn to control time-on-task □ Learn to use short-term memory □ Learn to discriminate among cues, signals, objects, people in the environment	□ Body Awareness □ Vestibular ☑ Proprioceptive ☑ Visual □ Auditory □ Tactile	□ Verbal cues/ motivation □ Visual and Auditory cues □ Demonstrations □ Mental pre-set □ Maintain concentrations □ Attentional switching □ Organization ☑ Frequent/ immediate feedback □ Individualized activities *Repetition (hb)	☑ Positive reinforcement □ Response cost □ Token economy □ Reduce external distractions □

Activities	Individualized activities and homework
➢ Following moving objects with eyes, without moving head- ball on a string and flash light. (took too long) ➢ Learning to juggle with 2 beanbags ~~and later tennis balls~~ (not possible struggle too much with bb) ➢ Manipulating ball @ own pace through beacons ➢ Dribble with foot ~~and hand~~ ➢ Throw and catch without partner and with partner ➢ Spatial inclusion- using auditive as well, partner stands behind person bouncing ball to left, right or over head. Person has to be ready to swivel and move to catch ball before second bounce. Ball and bucket- person is ready to catch ball with bucket- ball can be thrown through air or bounced. Person must catch ball before second bounce.	* Juggle - socks x 10 left + right * Try one-hand throw
Comment: * moving @ own pace = another world. unnessecary movement * Good @ foot-eye = "falls" apart with speed * work @ own pace no matter what * Show bt of Autism signs = Easily distracted. Lose own story (lost 5 min about bee)	difficulty to refocus

Name :	Age:	Facility/ Location:	Date:
Andrea	7	Outdoors	12-05-2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
□ Learn to control distractibility □ Learn to control visual tracking □ Learn to control time-on-task ☑ Learn to use short-term memory □ Learn to discriminate among cues, signals, objects, people in the environment	☑ Body Awareness □ Vestibular □ Proprioceptive □ Visual □ Auditory □ Tactile	☑ Verbal cues/ motivation □ Visual and Auditory cues □ Demonstrations □ Mental pre-set ☑ Maintain concentration (very difficult) □ Attentional switching □ Organization ☑ Frequent/ immediate feedback ☑ Individualized activities	☑ Positive reinforcement ☑ Response cost □ Token economy □ Reduce external distractions □

Activities	Individualized activities and homework
➢ Simon Says ➢ What did i spell ➢ Shifting beanbags- midline crossing ➢ Clapping game- body parts and memory sequencing e.g. 1 clap= touch nose, 2 claps= jump in air, 3 claps= touch left knee, 4 claps= turn 360 degrees ➢ Moving different directions and intensities difficult ➢ Jumping on dots- directions — immature jump, very rigid (Basic stance typ) ➢ Braingym activities on wall NO Tasks while standing on bozu ball (too much stimulation)	Practice hops + 1 leg balance * Practice juggle
Comment: * concept of simon says too difficult? abstract? * Remember 1st + last = carried away by creative story. Notes up on middle * very distracted by ongoing activity by other learners. too many questions about everything!	Did not practice previous weeks homework

Name :	Age:	Facility/ Location:	Date:
④ ~~André~~	7	Outdoors	19-05-2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
□ Learn to control distractibility □ Learn to control visual tracking ☑ Learn to control time-on-task □ Learn to use short-term memory □ Learn to discriminate among cues, signals, objects, people in the environment	□ Body Awareness □ Vestibular □ Proprioceptive □ Visual ☑ Auditory □ Tactile	☑ Verbal cues/ motivation □ Visual and Auditory cues □ Demonstrations ☑ Mental pre-set □ Maintain concentrations □ Attentional switching □ Organization □ Frequent/ immediate feedback □ Individualized activities	☑ Positive reinforcement □ Response cost □ Token economy □ Reduce external distractions □

Activities	Individualized activities and homework
➢ Obstacle- how will you go about overcoming obstacle-think and tell and then act...rethink and act. ➢ Swopping balls into same colors- rules to game. Thing, tell and do. ➢ Task at hand... how will you solve task... tactile and aditory- grouping and memorizing ➢ Goodie bag	Practice juggle ↳ faster – faster
Comment: * Encouraged to listen to own voice and instructions. * Excessive talking out short = keep on track. Focus! * very poor @ taking turns	

Name :	Age:	Facility/ Location:	Date:
(5) Andre'	7	Outdoors (5 step)	26-03-2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
☑ Learn to control distractibility □ Learn to control visual tracking □ Learn to control time-on-task □ Learn to use short-term memory ☑ Learn to discriminate among cues, signals, objects, people in the environment	□ Body Awareness □ Vestibular ☑ Proprioceptive ☑ Visual □ Auditory □ Tactile	☑ Verbal cues/ motivation □ Visual and Auditory cues ☑ Demonstrations □ Mental pre-set ☑ Maintain concentrations □ Attentional switching □ Organization □ Frequent/ immediate feedback □ Individualized activities * eye contact	□ Positive reinforcement ☑ Response cost (need time out) □ Token economy □ Reduce external distractions □

Activities	Individualized activities and homework
➢ Throwing @ targets on wall ➢ Throwing into bucket and different obstacles on ground ➢ Throwing @ cones disregard other colors- only concentrating on colors called out ➢ Rolling balls @ different targets ➢ Kicking ball @ differnt targets ➢ Hoop vs Bucket ➢ Variety with different instructions	Start with little distractions and add as person can disregard more distractions
Comment: * Enjoyed activities. = very poor @ aiming + target games * Performance + movement very rigid * Transfer problems = lots of repetition in instructions. * easily tired * throwing very hard = rigid, immature throw	

Appendix C- Case Study Three

HANDTEKENING VAN OUER/ VOOG

Die bostaande inligting was deur me Ingha Rathbone aan my verskaf in beide Afrikaans en Engels by 'n bespreking vir potensiële deelnemers aan die studie. Ek is minstens een van die tale magtig waarin die inligting aan my oorgedra is. Daar was geleentheid vir vrae in verband met die studie wat na my satisfaksie beantwoord is.

Hiermee gee ek dus toestemming dat my kind aan die studie mag deelneem, indien hy/sy graag wil na alle inligting in 'n individuele sessie aan hom/haar oorgedra en verduidelik is deur me Ingha Rathbone.

Ernst Leicher

Naam van Kind

Ronel Leicher

Naam van Ouer / Voog

Handtekening van ouer/voog

21/5/2008

Datum

HANDTEKENING VAN KIND

Ek sal graag aan die fisieke aktiwiteits program wil deelneem soos deur Mej Rathbone aan my verduidelik is.

Ernst

Handtekening van Kind

21-05-2008

Datum

HANDTEKENING VAN NAVORSER

Ek verklaar dat ek die inligting in hierdie dokument verduidelik het aan Ranel Leicher (naam van ouer/voog) by geleentheid waar potensiële ouers ook vrae kon vra in verband met die studie. Hy/sy is aangemoedig en genoegsame tyd gegee om enige vrae te vra. Die voordrag is in Afrikaans en Engels aan die ouers/voog gedoen. Indien die ouer/voog positief oor hy/sy kind se deelname aan die program was is die ouer gevra om die bostaande toestemmingsbrief te teken.

Ek het individuele sessie met die kinders gehad na die ouer/voog se instemming in die fisieke aktiwiteits program. Gedurende die gesprek het ek in beide Afrikaans en Engels aan die leerders verduidelik wat die program behels en of hul enige vrae aangaande deelname het. Aan die einde van die sessie het ek die kind gevra of hy/sy wel vrywilliglik aan die program wil deelneem. Indien die leerder aangedui het dat hul wel aan die program wil deelneem het ek hul gevra om die bostaande toestemmingsbrief te teken.

Handtekening van Navorser	21-05-2008 **Datum**

Ernst Leicher (Gr 3)
12/06/08

SHORTForm

	Raw Score								Point Score
Subtest 1: Fine Motor Precision									
3 Drawing Lines through Paths—Crooked	0 errors	Raw	≥21	15–20	10–14	6–9	4–5	2–3	1	0	7
		Point	0	1	2	3	4	5	6	7	
6 Folding Paper	12 points	Raw	0	1–2	3–4	5–6	7–8	9–10	11	12	7
		Point	0	1	2	3	4	5	6	7	

Subtest 2: Fine Motor Integration	Basic Shape	Closure	Edges	Orientation	Overlap	Overall Size	Raw Score*	
2 Copying a Square	0 1	0 1	0 1	0 1		0 1	4 points	4
7 Copying a Star	0 1	0 1	0 1	0 1		0 1	4 points	4

Subtest 3: Manual Dexterity	Raw Score Trial 1	Raw Score Trial 2											
Transferring Pennies (15 sec)	7 pennies	14 pennies	Raw	0–2	3–4	5–6	7–8	9–10	11–12	13–14	15–16	17–18	19–20	6
			Point	0	1	2	3	4	5	6	7	8	9	

Subtest 4: Bilateral Coordination	Raw Score Trial 1	Raw Score Trial 2						
3 Jumping in Place—Same Sides Synchronized	5 jumps	5 jumps	Raw	0	1	2–4	5	3
			Point	0	1	2	3	
6 Tapping Feet and Fingers—Same Sides Synchronized	10 taps	10 taps	Raw	0	1	2–4	5–9	10	4
			Point	0	1	2	3	4	

Subtest 5: Balance	Raw Score Trial 1	Raw Score Trial 2						
2 Walking Forward on a Line	6 steps	steps	Raw	0	1–2	3–4	5	6	4
			Point	0	1	2	3	4	
7 Standing on One Leg on a Balance Beam—Eyes Open (10 sec)	4.2 seconds	10 seconds	Raw	0.0–0.9	1.0–2.9	3.0–5.9	6.0–9.9	10	4
			Point	0	1	2	3	4	

Subtest 6: Running Speed and Agility	Raw Score Trial 1	Raw Score Trial 2												
One-Legged Stationary Hop (15 sec)	14 hops	6 hops	Raw	0	1–2	3–5	6–9	10–14	15–19	20–24	25–29	30–39	40–49	≥50	4
			Point	0	1	2	3	4	5	6	7	8	9	10	

Subtest 7: Upper-Limb Coordination	Raw Score Trial 1	Raw Score Trial 2								
1 Dropping and Catching a Ball—Both Hands	5 catches		Raw	0	1	2	3	4	5	5
			Point	0	1	2	3	4	5	
6 Dribbling a Ball—Alternating Hands	10 dribbles	dribbles	Raw	0	1	2	3	4–5	6–7	8–9	10	7
			Point	0	1	2	3	4	5	6	7	

Subtest 8: Strength	Raw Score											
2a Knee Push-ups **OR** (circle one) 2b Full Push-ups (30 sec)	7 push-ups	Raw	0	1–2	3–5	6–10	11–15	16–20	21–25	26–30	31–35	≥36	3
		Point	0	1	2	3	4	5	6	7	8	9	
3 Sit-ups (30 sec)	10 sit-ups	Raw	0	1–2	3–5	6–10	11–15	16–20	21–25	26–30	31–35	≥36	3
		Point	0	1	2	3	4	5	6	7	8	9	

Notes & Observations

65
Total Point Score Short Form (max = 88)

* For Subtest 2: Fine Motor Integration, add the facet scores, record the sum in the Raw Score column, and transfer the raw score for each item directly to the corresponding oval in the Point Score column.

Ernst Leicher
22/07/08

SHORTForm

Subtest 1: Fine Motor Precision

	Raw Score									Point Score
3 Drawing Lines through Paths—Crooked	0 errors	Raw	≥21	15–20	10–14	6–9	4–5	2–3	1	0	7
		Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
6 Folding Paper	6 points	Raw	0	1–2	3–4	5–6	7–8	9–10	11	12	6
		Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	

Subtest 2: Fine Motor Integration

	Basic Shape	Closure	Edges	Orientation	Overlap	Overall Size	Raw Score*	Point Score
2 Copying a Square	0 1	0 1	0 1	0 1		0 1	4 points	4
7 Copying a Star	0 1	0 1	0 1	0 1		0 1	4 points	4

Subtest 3: Manual Dexterity

	Raw Score Trial 1	Raw Score Trial 2											Point Score
2 Transferring Pennies (15 sec)	15 pennies	14 pennies	Raw	0–2	3–4	5–6	7–8	9–10	11–12	13–14	15–16	17–18	19–20	7
			Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	

Subtest 4: Bilateral Coordination

	Raw Score Trial 1	Raw Score Trial 2							Point Score
3 Jumping in Place—Same Sides Synchronized	5 jumps	5 jumps	Raw	0	1	2–4	5		3
			Point	**0**	**1**	**2**	**3**		
6 Tapping Feet and Fingers—Same Sides Synchronized	8 taps	9 taps	Raw	0	1	2–4	5–9	10	3
			Point	**0**	**1**	**2**	**3**	**4**	

Subtest 5: Balance

	Raw Score Trial 1	Raw Score Trial 2								Point Score
2 Walking Forward on a Line	6 steps	6 steps	Raw	0	1–2	3–4	5	6		4
			Point	**0**	**1**	**2**	**3**	**4**		
7 Standing on One Leg on a Balance Beam—Eyes Open (10 sec)	10 seconds	10 seconds	Raw	0.0–0.9	1.0–2.9	3.0–5.9	6.0–9.9	10		4
			Point	**0**	**1**	**2**	**3**	**4**		

Subtest 6: Running Speed and Agility

	Raw Score Trial 1	Raw Score Trial 2											Point Score
2 One-Legged Stationary Hop (15 sec)	10 hops	10 hops	Raw	0	1–2	3–5	6–9	10–14	15–19	20–24	25–29	30–39	40–49	≥50	4
			Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	

Subtest 7: Upper-Limb Coordination

	Raw Score Trial 1	Raw Score Trial 2									Point Score
1 Dropping and Catching a Ball—Both Hands	5 catches		Raw	0	1	2	3	4	5		5
			Point	**0**	**1**	**2**	**3**	**4**	**5**		
6 Dribbling a Ball—Alternating Hands	6 dribbles	8 dribbles	Raw	0	1	2	3	4–5	6–7	8–9	10		6
			Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**		

Subtest 8: Strength

	Raw Score										Point Score
2a Knee Push-ups **OR** (circle one) 2b Full Push-ups (30 sec)	10 push-ups	Raw	0	1–2	3–5	6–10	11–15	16–20	21–25	26–30	31–35	≥36	3
		Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	
3 Sit-ups (30 sec)	11 sit-ups	Raw	0	1–2	3–5	6–10	11–15	16–20	21–25	26–30	31–35	≥36	4
		Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	

Notes & Observations

64

Total Point Score Short Form (max = 88)

* For Subtest 2: Fine Motor Integration, add the facet scores, record the sum in the Raw Score column, and transfer the raw score for each item directly to the corresponding oval in the Point Score column.

Ernst
09-09-08

SHORTForm

Subtest	Raw Score	Point Score
Subtest 1: Fine Motor Precision		
3 Drawing Lines through Paths—Crooked	0 errors	7
6 Folding Paper	11 points	6
Subtest 2: Fine Motor Integration		
2 Copying a Square	4 points	4
7 Copying a Star	5 points	5
Subtest 3: Manual Dexterity	Trial 1 / Trial 2	
2 Transferring Pennies (15 sec)	11 pennies / 17 pennies	8
Subtest 4: Bilateral Coordination	Trial 1 / Trial 2	
3 Jumping in Place—Same Sides Synchronized	5 jumps / jumps	3
6 Tapping Feet and Fingers—Same Sides Synchronized	10 taps / 10 taps	4
Subtest 5: Balance	Trial 1 / Trial 2	
2 Walking Forward on a Line	6 steps / steps	4
7 Standing on One Leg on a Balance Beam—Eyes Open (10 sec)	10 seconds / 10 seconds	4
Subtest 6: Running Speed and Agility	Trial 1 / Trial 2	
3 One-Legged Stationary Hop (15 sec)	25 hops / 28 hops	7
Subtest 7: Upper-Limb Coordination	Trial 1 / Trial 2	
1 Dropping and Catching a Ball—Both Hands	5 catches /	5
6 Dribbling a Ball—Alternating Hands	10 dribbles / dribbles	7
Subtest 8: Strength	Raw Score	
2a Knee Push-ups OR 2b Full Push-ups (30 sec)	22 push-ups	6
3 Sit-ups (30 sec)	20 sit-ups	5

Subtest 1: Drawing Lines through Paths—Crooked									
Raw	≥21	15–20	10–14	6–9	4–5	2–3	1	0
Point	0	1	2	3	4	5	6	7

Subtest 1: Folding Paper									
Raw	0	1–2	3–4	5–6	7–8	9–10	11	12
Point	0	1	2	3	4	5	6	7

Subtest 2: Fine Motor Integration	Basic Shape	Closure	Edges	Orientation	Overlap	Overall Size	Raw Score*
2 Copying a Square	0 (1)	0 (1)	(0) 1	0 (1)		0 (1)	4 points
7 Copying a Star	0 (1)	0 (1)	0 (1)	0 (1)		0 (1)	5 points

Subtest 3: Manual Dexterity											
Raw	0–2	3–4	5–6	7–8	9–10	11–12	13–14	15–16	17–18	19–20
Point	0	1	2	3	4	5	6	7	8	9

Subtest 4: Bilateral Coordination					
Raw	0	1	2–4	5
Point	0	1	2	3

Subtest 4: Bilateral Coordination					
Raw	0	1	2–4	5–9	10
Point	0	1	2	3	4

Subtest 5: Balance					
Raw	0	1–2	3–4	5	6
Point	0	1	2	3	4

Subtest 5: Balance					
Raw	0.0–0.9	1.0–2.9	3.0–5.9	6.0–9.9	10
Point	0	1	2	3	4

Subtest 6: Running Speed and Agility											
Raw	0	1–2	3–5	6–9	10–14	15–19	20–24	25–29	30–39	40–49	≥50
Point	0	1	2	3	4	5	6	7	8	9	10

Subtest 7: Upper-Limb Coordination							
Raw	0	1	2	3	4	5
Point	0	1	2	3	4	5

Subtest 7: Upper-Limb Coordination								
Raw	0	1	2	3	4–5	6–7	8–9	10
Point	0	1	2	3	4	5	6	7

Subtest 8: Strength										
Raw	0	1–2	3–5	6–10	11–15	16–20	21–25	26–30	31–35	≥36
Point	0	1	2	3	4	5	6	7	8	9

Subtest 8: Strength										
Raw	0	1–2	3–5	6–10	11–15	16–20	21–25	26–30	31–35	≥36
Point	0	1	2	3	4	5	6	7	8	9

Notes & Observations

Total Point Score Short Form (max = 88): 75

* For Subtest 2: Fine Motor Integration, add the face scores, record the sum in the Raw Score column, and transfer the raw score for each item directly to the corresponding oval in the Point Score column.

Name :	Age:	Facility/ Location:	Date:
(1) Ernst	9	Indoors / Staff room	29-07-2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
☑ Learn to control distractibility □ Learn to control visual tracking □ Learn to control time-on-task □ Learn to use short-term memory □ Learn to discriminate among cues, signals, objects, people in the environment	☑ Body Awareness ☑ Vestibular ☑ Proprioceptive □ Visual □ Auditory □ Tactile	☑ Verbal cues/ motivation □ Visual and Auditory cues ☑ Demonstrations □ Mental pre-set ☑ Maintain concentrations □ Attentional switching □ Organization ☑ Frequent/ immediate feedback □ Individualized activities	□ Positive reinforcement □ Response cost □ Token economy ☑ Reduce external distractions □

Activities	Individualized activities and homework
➢ Static balance on ball- proper form on ball ➢ Dynamic Balance- moving hips and arms ➢ Assisted push-up on ball and floor ➢ Tabletop- Balance ➢ Walking out with Ball ➢ Bridging Rhythm and Dance- tapping bodyparts and hopping on ball	* Jumping blocks → double + single foot * step → running + jumping
Comment: * Stable + strong core * wants to do some activities TOO Fast = still "falls apart" * very pessimistic learner * good body awareness sense = problem inability to stay focused * repitition of instructions to keep him focused	

Name :	Age:	Facility/ Location:	Date:
(2) ~~Eliot~~	9	Outdoors	05-08-2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
□ Learn to control distractibility ☑ Learn to control visual tracking □ Learn to control time-on-task □ Learn to use short-term memory □ Learn to discriminate among cues, signals, objects, people in the environment	□ Body Awareness □ Vestibular ☑ Proprioceptive ☑ Visual □ Auditory □ Tactile	□ Verbal cues/ motivation ☑ Visual and Auditory cues □ Demonstrations □ Mental pre-set □ Maintain concentrations □ Attentional switching □ Organization ☑ Frequent/ immediate feedback □ Individualized activities * repitition	☑ Positive reinforcement (bean bucket?) □ Response cost □ Token economy □ Reduce external distractions □

Activities	Individualized activities and homework
➢ Following moving objects with eyes, without moving head- ball on a string and flash light. ➢ Learning to juggle with 2 beanbags and later tennis balls ➢ Manipulating ball @ own pace through beacons ➢ Dribble with foot and hand ➢ Throw and catch without partner and with partner ➢ Spatial inclusion- using auditive as well, partner stands behind person bouncing ball to left, right or over head. Person has to be ready to swivel and move to catch ball before second bounce. Enjoys activity!! Ball and bucket- person is ready to catch ball with bucket- ball can be thrown through air or bounced. Person must catch ball before second bounce.	* modified juggle with socks + tennisball * One-handed throwing + catching against wall
Comment: * Very skilled learner * tends to work too (fast) * good @ manipulating different objects * needs to slow down → ↑ performance * fails to keep on track if not interested. Competitive child.	

Name :	Age:	Facility/ Location:	Date:
(5) Ernst	9	Outdoors	12 - 08 - 2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
□ Learn to control distractibility □ Learn to control visual tracking ☑ Learn to control time-on-task ☑ Learn to use short-term memory □ Learn to discriminate among cues, signals, objects, people in the environment	☑ Body Awareness □ Vestibular ☑ Proprioceptive □ Visual ☑ Auditory □ Tactile	☑ Verbal cues/ motivation □ Visual and Auditory cues □ Demonstrations ☑ Mental pre-set □ Maintain concentrations □ Attentional switching ☑ Organization ☑ Frequent/ immediate feedback □ Individualized activities	☑ Positive reinforcement □ Response cost □ Token economy □ Reduce external distractions □

Activities	Individualized activities and homework
➢ Simon Says ➢ What did i spell ➢ Shifting beanbags- midline crossing ➢ Clapping game- body parts and memory sequencing e.g. 1 clap= touch nose, 2 claps= jump in air, 3 claps= touch left knee, 4 claps= turn 360 degrees ➢ Moving different directions and intensities ➢ Jumping on dots- directions ➢ Braingym activities on wall Tasks while standing on bozu ball	Juggle
Comment: * Strict keeping him on track, not rushing activity. * Able to stay focussed	

Name :	Age:	Facility/ Location:	Date:
④ Ernest	9	Outdoors	19 - 08 - 2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
□ Learn to control distractibility □ Learn to control visual tracking ☑ Learn to control time-on-task □ Learn to use short-term memory □ Learn to discriminate among cues, signals, objects, people in the environment	□ Body Awareness □ Vestibular □ Proprioceptive □ Visual ☑ Auditory □ Tactile	☑ Verbal cues/ motivation □ Visual and Auditory cues □ Demonstrations ☑ Mental pre-set □ Maintain concentrations □ Attentional switching □ Organization □ Frequent/ immediate feedback □ Individualized activities	☑ Positive reinforcement □ Response cost □ Token economy □ Reduce external distractions □

Activities	Individualized activities and homework
➢ Obstacle- how will you go about overcoming obstacle-think and tell and then act...rethink and act. ➢ Swopping balls into same colors- rules to game. Thing, tell and do. ➢ Task at hand... how will you solve task... tactile and aditory- grouping and memorizing ➢ Goodie bag = tactile	* Juggle
Comment: * Very strict to keep him focused * Strict to keep Ernie from rushing * Could stay focused	

Name :	Age:	Facility/ Location:	Date:
(5) Ernest	9	Outdoors (Step)	26 - 08 - 2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
☑ Learn to control distractibility ☐ Learn to control visual tracking ☐ Learn to control time-on-task ☐ Learn to use short-term memory ☑ Learn to discriminate among cues, signals, objects, people in the environment	☐ Body Awareness ☐ Vestibular ☑ Proprioceptive ☑ Visual ☐ Auditory ☐ Tactile	☑ Verbal cues/ motivation ☐ Visual and Auditory cues ☑ Demonstrations ☐ Mental pre-set ☑ Maintain concentrations ☑ Attentional switching ☐ Organization ☐ Frequent/ immediate feedback ☑ Individualized activities * encouragement	☑ Positive reinforcement (NB) ☐ Response cost ☐ Token economy ☐ Reduce external distractions ☐

Activities	Individualized activities and homework
➢ Throwing @ targets on wall ➢ Throwing into bucket and different obstacles on ground ➢ Throwing @ cones disregard other colors- only concentrating on colors called out ➢ Rolling balls @ different targets ➢ Kicking ball @ differnt targets ➢ Hoop vs Bucket ➢ Variety with different instructions	Start with little distractions and add as person can disregard more distractions
Comment: * Enjoyed all activities. Very competitive with self. Good at aiming * over corrects ** performance when distance ↑ * encouragement = give up when unsuccessful * force + strength problems = overcorrects.	

Appendix D- Case Study Four

SIGNATURE OF RESEARCH SUBJECT OR LEGAL REPRESENTATIVE

The information above was provided to me by Ingha Rathbone in English and Afrikaans at a group meeting of parents of potential participants in this study. I am in command of one or both of these languages. We were given the opportunity to ask questions and these questions were answered to my satisfaction.

I hereby consent to allow my child to be given the opportunity to participate in this study, if he/she would like to do so after hearing a presentation made individually to him/her about the programme from Ingha Rathbone.

CRAIG ENSLIN

Name of Child

PERRY ENSLIN

Name of Parent or Legal Representative

Signature of Parent or Legal Representative

1/8/08

Date

SIGNATURE OF CHILD

I would like to join the physical activity programme that Miss Rathbone described to me.

craig ENSLIN

Signature of Child

1/8/08

Date

SIGNATURE OF INVESTIGATOR

I declare that I explained the information given in this document to_____ (name of parent or legal representative) at a group session with the parents of all potential participants. He/she was encouraged and given ample time to ask me any questions. This presentation was conducted in English and in Afrikaans. If the parents/legal representative was positive about his/her child's participation, they were asked to sign the consent form above.

I then spoke individually with each of the children whose parent/legal representative had indicated that they wanted their child to have the opportunity to participate in the physical activity programme. During this conversation in either English or Afrikaans (depending on the chillds' preference), I encouraged him/her to ask me questions. I asked at the end of the conversation if the child wanted to volunteer to join the programme. If the answer was affirmative, I asked the child to sign the consent form above

Signature of Investigator

01-08-2008

Date

Graig Enslin (Gr 5)
12/06/08

SHORTForm

Subtest 1: **Fine Motor Precision**	Raw Score									Point Score
3 Drawing Lines through Paths—Crooked	0 errors	Raw	≥21	15–20	10–14	6–9	4–5	2–3	1	0	7
		Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
6 Folding Paper	8 points	Raw	0	1–2	3–4	5–6	7–8	9–10	11	12	4
		Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	

Subtest 2: **Fine Motor Integration**	Basic Shape	Closure	Edges	Orientation	Overlap	Overall Size	Raw Score*	Point Score
2 Copying a Square	0 (1)	0 (1)	0 (1)	0 (1)		0 (1)	4 points	4
7 Copying a Star	0 (1)	(0) 1	(0) 1	0 (1)		0 (1)	3 points	3

Subtest 3: **Manual Dexterity**	Raw Score Trial 1	Raw Score Trial 2											Point Score
Transferring Pennies (15 sec)	14 pennies	14 pennies	Raw	0–2	3–4	5–6	7–8	9–10	11–12	13–14	15–16	17–18	19–20	6
			Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	

Subtest 4: **Bilateral Coordination**	Raw Score Trial 1	Raw Score Trial 2						Point Score
3 Jumping in Place—Same Sides Synchronized	2 jumps	2 jumps	Raw	0	1	2–4	5	2
			Point	**0**	**1**	**2**	**3**	
6 Tapping Feet and Fingers—Same Sides Synchronized	5 taps	5 taps	Raw	0	1	2–4	5–9	10	3
			Point	**0**	**1**	**2**	**3**	**4**	

Subtest 5: **Balance**	Raw Score Trial 1	Raw Score Trial 2							Point Score
2 Walking Forward on a Line	6 steps	steps	Raw	0	1–2	3–4	5	6	4
			Point	**0**	**1**	**2**	**3**	**4**	
7 Standing on One Leg on a Balance Beam—Eyes Open (10 sec)	1.5 seconds	1 seconds	Raw	0.0–0.9	1.0–2.9	3.0–5.9	6.0–9.9	10	1
			Point	**0**	**1**	**2**	**3**	**4**	

Subtest 6: **Running Speed and Agility**	Raw Score Trial 1	Raw Score Trial 2												Point Score
One-Legged Stationary Hop (15 sec)	21 hops	25 hops	Raw	0	1–2	3–5	6–9	10–14	15–19	20–24	25–29	30–39	40–49	≥50	7
			Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	

Subtest 7: **Upper-Limb Coordination**	Raw Score Trial 1	Raw Score Trial 2									Point Score
1 Dropping and Catching a Ball—Both Hands	5 catches		Raw	0	1	2	3	4	5		5
			Point	**0**	**1**	**2**	**3**	**4**	**5**		
6 Dribbling a Ball—Alternating Hands	10 dribbles	dribbles	Raw	0	1	2	3	4–5	6–7	8–9	10	7
			Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	

Subtest 8: **Strength**	Raw Score											Point Score
2a Knee Push-ups **OR** (circle one) **2b** Full Push-ups (30 sec)	4 push-ups	Raw	0	1–2	3–5	6–10	11–15	16–20	21–25	26–30	31–35	≥36	2
		Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	
3 Sit-ups (30 sec)	0 sit-ups	Raw	0	1–2	3–5	6–10	11–15	16–20	21–25	26–30	31–35	≥36	0
		Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	

Notes & Observations

55
Total Point Score
Short Form
(max = 88)

* For Subtest 2: Fine Motor Integration, add the facet scores, record the sum in the Raw Score column, and transfer the raw score for each item directly to the corresponding oval in the Point Score column.

Craig Enstin
22/07/08

SHORTForm

Subtest 1: Fine Motor Precision

	Raw Score	Raw	≥21	15–20	10–14	6–9	4–5	2–3	1	0	Point Score
3 Drawing Lines through Paths—Crooked	0 errors	Point	0	1	2	3	4	5	6	**7**	7
6 Folding Paper	12 points	Raw	0	1–2	3–4	5–6	7–8	9–10	11	12	7
		Point	0	1	2	3	4	5	6	**7**	

Subtest 2: Fine Motor Integration

	Basic Shape	Closure	Edges	Orientation	Overlap	Overall Size	Raw Score*	Point Score
2 Copying a Square	0 **1**	0 **1**	0 **1**	0 **1**		0 **1**	5 points	5
7 Copying a Star	0 **1**	0 **1**	**0** 1	0 **1**		0 **1**	4 points	4

Subtest 3: Manual Dexterity

	Raw Score Trial 1	Raw Score Trial 2	Raw	0–2	3–4	5–6	7–8	9–10	11–12	13–14	15–16	17–18	19–20	Point Score
Transferring Pennies (15 sec)	14 pennies	15 pennies	Point	0	1	2	3	4	5	6	**7**	8	9	7

Subtest 4: Bilateral Coordination

	Raw Score Trial 1	Raw Score Trial 2	Raw	0	1	2–4	5	10	Point Score
3 Jumping in Place—Same Sides Synchronized	3 jumps	4 jumps	Point	0	1	**2**	3		2
6 Tapping Feet and Fingers—Same Sides Synchronized	10 taps	10 taps	Point	0	1	2	3	**4**	4

Subtest 5: Balance

	Raw Score Trial 1	Raw Score Trial 2	Raw	0	1–2	3–4	5	6	0.0–0.9	1.0–2.9	3.0–5.9	6.0–9.9	10	Point Score
2 Walking Forward on a Line	6 steps	6 steps	Point	0	1	2	3	**4**						4
7 Standing on One Leg on a Balance Beam—Eyes Open (10 sec)	5 seconds	~~5~~ seconds	Point						0	1	**2**	3	4	2

Subtest 6: Running Speed and Agility

	Raw Score Trial 1	Raw Score Trial 2	Raw	0	1–2	3–5	6–9	10–14	15–19	20–24	25–29	30–39	40–49	≥50	Point Score
One-Legged Stationary Hop (15 sec)	19 hops	26 hops	Point	0	1	2	3	4	5	**6**	7	8	9	10	6

Subtest 7: Upper-Limb Coordination

	Raw Score Trial 1	Raw Score Trial 2	Raw	0	1	2	3	4	5	6–7	8–9	10	Point Score
1 Dropping and Catching a Ball—Both Hands	5 catches		Point	0	1	2	3	4	**5**				5
6 Dribbling a Ball—Alternating Hands	7 dribbles	10 dribbles	Point	0	1	2	3	4	5	6	7	**7**	7

Subtest 8: Strength

	Raw Score	Raw	0	1–2	3–5	6–10	11–15	16–20	21–25	26–30	31–35	≥36	Point Score
2a Knee Push-ups **OR** (circle one) 2b Full Push-ups (30 sec)	2 push-ups	Point	0	**1**	2	3	4	5	6	7	8	9	1
3 Sit-ups (30 sec)	14 sit-ups	Point	0	1	2	3	**4**	5	6	7	8	9	4

Notes & Observations

65

Total Point Score Short Form (max = 88)

* For Subtest 2: Fine Motor Integration, add the facet scores, record the sum in the Raw Score column, and transfer the raw score for each item directly to the corresponding oval in the Point Score column.

Craig (12)
09-09-08

SHORT Form

Subtest 1: Fine Motor Precision

	Raw Score	Point Score
3 Drawing Lines through Paths—Crooked	0 errors	7
6 Folding Paper	12 points	7

Raw	≥21	15–20	10–14	6–9	4–5	2–3	1	0
Point	0	1	2	3	4	5	6	7

Raw	0	1–2	3–4	5–6	7–8	9–10	11	12
Point	0	1	2	3	4	5	6	7

Subtest 2: Fine Motor Integration

	Basic Shape	Closure	Edges	Orientation	Overlap	Overall Size	Raw Score*	Point Score
2 Copying a Square	0 (1)	0 (1)	0 (1)	0 (1)		0 (1)	5 points	5
7 Copying a Star	0 (1)	0 (1)	0 (1)	0 (1)		0 (1)	5 points	5

Subtest 3: Manual Dexterity

	Raw Score Trial 1	Raw Score Trial 2	Point Score
2 Transferring Pennies (15 sec)	16 pennies	16 pennies	7

Raw	0–2	3–4	5–6	7–8	9–10	11–12	13–14	15–16	17–18	19–20
Point	0	1	2	3	4	5	6	7	8	9

Subtest 4: Bilateral Coordination

	Raw Score Trial 1	Raw Score Trial 2	Point Score
3 Jumping in Place—Same Sides Synchronized	5 jumps	5 jumps	3
6 Tapping Feet and Fingers—Same Sides Synchronized	10 taps	10 taps	4

Raw	0	1	2–4	5
Point	0	1	2	3

Raw	0	1	2–4	5–9	10
Point	0	1	2	3	4

Subtest 5: Balance

	Raw Score Trial 1	Raw Score Trial 2	Point Score
2 Walking Forward on a Line	6 steps	6 steps	4
7 Standing on One Leg on a Balance Beam—Eyes Open (10 sec)	6 seconds	7 seconds	3

Raw	0	1–2	3–4	5	6
Point	0	1	2	3	4

Raw	0.0–0.9	1.0–2.9	3.0–5.9	6.0–9.9	10
Point	0	1	2	3	4

Subtest 6: Running Speed and Agility

	Raw Score Trial 1	Raw Score Trial 2	Point Score
3 One-Legged Stationary Hop (15 sec)	27 hops	30 hops	8

Raw	0	1–2	3–5	6–9	10–14	15–19	20–24	25–29	30–39	40–49	≥50
Point	0	1	2	3	4	5	6	7	8	9	10

Subtest 7: Upper-Limb Coordination

	Raw Score Trial 1	Raw Score Trial 2	Point Score
1 Dropping and Catching a Ball—Both Hands	5 catches		5
6 Dribbling a Ball—Alternating Hands	10 dribbles	dribbles	7

Raw	0	1	2	3	4	5
Point	0	1	2	3	4	5

Raw	0	1	2	3	4–5	6–7	8–9	10
Point	0	1	2	3	4	5	6	7

Subtest 8: Strength

	Raw Score	Point Score
2a Knee Push-ups OR (circle one) 2b Full Push-ups (30 sec)	10 push-ups	3
3 Sit-ups (30 sec)	10 sit-ups	3

Raw	0	1–2	3–5	6–10	11–15	16–20	21–25	26–30	31–35	≥36
Point	0	1	2	3	4	5	6	7	8	9

Raw	0	1–2	3–5	6–10	11–15	16–20	21–25	26–30	31–35	≥36
Point	0	1	2	3	4	5	6	7	8	9

Notes & Observations

71

Total Point Score Short Form (max = 88)

* For Subtest 2: Fine Motor Integration, add the factor scores, record the sum in the Raw Score column, and transfer the raw score for each item directly to the corresponding oval in the Point Score column.

Name :	Age:	Facility/ Location:	Date:
① Craig	12	Indoors /Staff room	29-07-2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
☑ Learn to control distractibility □ Learn to control visual tracking □ Learn to control time-on-task □ Learn to use short-term memory □ Learn to discriminate among cues, signals, objects, people in the environment	□ Body Awareness ☑ Vestibular ☑ Proprioceptive □ Visual □ Auditory □ Tactile	☑ Verbal cues/ motivation □ Visual and Auditory cues ☑ Demonstrations □ Mental pre-set □ Maintain concentrations □ Attentional switching □ Organization ☑ Frequent/ immediate feedback ☑ Individualized activities * Repitition (NB)	□ Positive reinforcement □ Response cost □ Token economy □ Reduce external distractions □

Activities	Individualized activities and homework
➢ Static balance on ball- proper form on ball ➢ Dynamic Balance- moving hips and arms ➢ Assisted push-up on ball and floor ➢ Tabletop- Balance ➢ Walking out with Ball ➢ Bridging Rhythm and Dance- tapping bodyparts and hopping on ball	* Bridge * Jumping blocks ↓ double + single foot

Comment:
* Extremely unstable core, struggled to complete most of activities
* Gives up quickly = prefer some nice easy activity he can do/ like does
(NB) * Lack focussed attention
* Excessive talking
* Body awareness not good because of focus.
* Quits when tired or struggling

Name :	Age:	Facility/ Location:	Date:
② Craig	12	Outdoors	05-08-2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
□ Learn to control distractibility ☑ Learn to control visual tracking □ Learn to control time-on-task □ Learn to use short-term memory □ Learn to discriminate among cues, signals, objects, people in the environment	□ Body Awareness □ Vestibular ☑ Proprioceptive □ Visual □ Auditory □ Tactile	□ Verbal cues/ motivation ☑ Visual and Auditory cues □ Demonstrations □ Mental pre-set □ Maintain concentrations □ Attentional switching □ Organization ☑ Frequent/ immediate feedback □ Individualized activities * Repitition	☑ Positive reinforcement □ Response cost □ Token economy □ Reduce external distractions □

Activities	Individualized activities and homework
➢ Following moving objects with eyes, without moving head- ball on a string and flash light. ➢ Learning to juggle with 2 beanbags and later tennis balls ➢ Manipulating ball @ own pace through beacons ➢ Dribble with foot and hand ➢ Throw and catch without partner and with partner ➢ Spatial inclusion- using auditive as well, partner stands behind person bouncing ball to left, right or over head. Person has to be ready to swivel and move to catch ball before second bounce. Ball and bucket- person is ready to catch ball with bucket- ball can be thrown through air or bounced. Person must catch ball before second bounce.	* Juggling → modified + tennisball * one-handed throwing + catching
Comment: * Very aware of other individuals. self conscience * Skilled learner → activities too fast = still falls apart" * Foot-eye coordination very good = tends to get carried away	Did do homework

Name :	Age:	Facility/ Location:	Date:
Craig	12	Outdoors	12-08-2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
□ Learn to control distractibility □ Learn to control visual tracking □ Learn to control time-on-task ☑ Learn to use short-term memory □ Learn to discriminate among cues, signals, objects, people in the environment	☑ Body Awareness □ Vestibular □ Proprioceptive □ Visual □ Auditory □ Tactile	☑ Verbal cues/ motivation □ Visual and Auditory cues □ Demonstrations □ Mental pre-set □ Maintain concentrations □ Attentional switching □ Organization ☑ Frequent/ immediate feedback □ Individualized activities * repitition	☑ Positive reinforcement □ Response cost □ Token economy □ Reduce external distractions □

Activities	Individualized activities and homework
➢ Simon Says + Memory game cards ➢ What did i spell ➢ Shifting beanbags- midline crossing ➢ Clapping game- body parts and memory sequencing e.g. 1 clap= touch nose, 2 claps= jump in air, 3 claps= touch left knee, 4 claps= turn 360 degrees ➢ Moving different directions and intensities ➢ Jumping on dots- directions ➢ Braingym activities on wall Tasks while standing on bozu ball	* Memory game cards
Comment: * Good body awareness * Enjoyed bozu ball activities = challenging * showed more focus	Didn't do homework

Name :	Age:	Facility/ Location:	Date:
(15) Craig	12	Outdoors	19-03-2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
□ Learn to control distractibility □ Learn to control visual tracking ☑ Learn to control time-on-task □ Learn to use short-term memory □ Learn to discriminate among cues, signals, objects, people in the environment	□ Body Awareness □ Vestibular □ Proprioceptive □ Visual ☑ Auditory ☑ Tactile	□ Verbal cues/ motivation □ Visual and Auditory cues □ Demonstrations ☑ Mental pre-set □ Maintain concentrations □ Attentional switching □ Organization □ Frequent/ immediate feedback □ Individualized activities	□ Positive reinforcement □ Response cost □ Token economy □ Reduce external distractions □

Activities	Individualized activities and homework
➢ Obstacle- how will you go about overcoming obstacle-think and tell and then act...rethink and act. ➢ Swopping balls into same colors- rules to game. Thing, tell and do. ➢ Task at hand... how will you solve task... tactile and aditory- grouping and memorizing ➢ Fun basket (tactile)	No homework
Comment: * Strict to keep him on track and ensure completion without rushing or excessive talking * Smart learner = grasps concepts fast	

Name :	Age:	Facility/ Location:	Date:
⑤ Craig	12	Outdoors	26-08-2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
☑ Learn to control distractibility □ Learn to control visual tracking □ Learn to control time-on-task □ Learn to use short-term memory ☑ Learn to discriminate among cues, signals, objects, people in the environment	□ Body Awareness □ Vestibular ☑ Proprioceptive ☑ Visual □ Auditory □ Tactile	☑ Verbal cues/ motivation □ Visual and Auditory cues □ Demonstrations □ Mental pre-set □ Maintain concentrations ☑ Attentional switching □ Organization □ Frequent/ immediate feedback □ Individualized activities	☑ Positive reinforcement □ Response cost □ Token economy □ Reduce external distractions □

Activities	Individualized activities and homework
➢ Throwing @ targets on wall ➢ Throwing into bucket and different obstacles on ground ➢ Throwing @ cones disregard other colors- only concentrating on colors called out ➢ Rolling balls @ different targets ➢ Kicking ball @ differnt targets ➢ Hoop vs Bucket ➢ Variety with different instructions	Start with little distractions and add as person can disregard more distractions
Comment: ⑤ * Flourish on encouragement * Discouraged when struggling or can't do = refocus and encourage, soon back on track * Working too fast → performance ↓ * Distance ↑ = ↓ performance accuracy	

Appendix E – Case Study Five

SIGNATURE OF RESEARCH SUBJECT OR LEGAL REPRESENTATIVE

The information above was provided to me by Ingha Rathbone in English and Afrikaans at a group meeting of parents of potential participants in this study. I am in command of one or both of these languages. We were given the opportunity to ask questions and these questions were answered to my satisfaction.

I hereby consent to allow my child to be given the opportunity to participate in this study, if he/she would like to do so after hearing a presentation made individually to him/her about the programme from Ingha Rathbone.

ALBERT BREDELL

Name of Child

ELMARIE BREDELL

Name of Parent or Legal Representative

EBredell — 06/05/08

Signature of Parent or Legal Representative — **Date**

SIGNATURE OF CHILD

I would like to join the physical activity programme that Miss Rathbone described to me.

ABredell — 10/06/08

Signature of Child — **Date**

SIGNATURE OF INVESTIGATOR

I declare that I explained the information given in this document to_____ (name of parent or legal representative) at a group session with the parents of all potential participants. He/she was encouraged and given ample time to ask me any questions. This presentation was conducted in English and in Afrikaans. If the parents/legal representative was positive about his/her child's participation, they were asked to sign the consent form above.

I then spoke individually with each of the children whose parent/legal representative had indicated that they wanted their child to have the opportunity to participate in the physical activity programme. During this conversation in either English or Afrikaans (depending on the chillds' preference), I encouraged him/her to ask me questions. I asked at the end of the conversation if the child wanted to volunteer to join the programme. If the answer was affirmative, I asked the child to sign the consent form above

Signature of Investigator

16 - 06 - 2008

Date

Albert Bredell (Gr 7)

12/06/08

SHORTForm

Subtest 1: **Fine Motor Precision**	Raw Score		Point Score
3 Drawing Lines through Paths—Crooked	0 errors	Raw: ≥21 / 15–20 / 10–14 / 6–9 / 4–5 / 2–3 / 1 / 0 — Point: 0 / 1 / 2 / 3 / 4 / 5 / 6 / 7	7
6 Folding Paper	12 points	Raw: 0 / 1–2 / 3–4 / 5–6 / 7–8 / 9–10 / 11 / 12 — Point: 0 / 1 / 2 / 3 / 4 / 5 / 6 / 7	7

Subtest 2: **Fine Motor Integration**	Basic Shape	Closure	Edges	Orientation	Overlap	Overall Size	Raw Score*	Point Score
2 Copying a Square	0 (1)	0 (1)	0 (1)	0 (1)		0 (1)	5 points	5
7 Copying a Star	0 (1)	0 (1)	0 (1)	0 (1)		0 (1)	5 points	5

Subtest 3: **Manual Dexterity**	Raw Score Trial 1	Raw Score Trial 2		Point Score
Transferring Pennies (15 sec)	15 pennies	16 pennies	Raw: 0–2 / 3–4 / 5–6 / 7–8 / 9–10 / 11–12 / 13–14 / 15–16 / 17–18 / 19–20 — Point: 0 / 1 / 2 / 3 / 4 / 5 / 6 (7) / 8 / 9	7

Subtest 4: **Bilateral Coordination**	Raw Score Trial 1	Raw Score Trial 2		Point Score
3 Jumping in Place—Same Sides Synchronized	5 jumps	5 jumps	Raw: 0 / 1 / 2–4 / 5 — Point: 0 / 1 / 2 / (3)	3
6 Tapping Feet and Fingers—Same Sides Synchronized	5 taps	5 taps	Raw: 0 / 1 / 2–4 / 5–9 / 10 — Point: 0 / 1 / 2 / (3) / 4	3

Subtest 5: **Balance**	Raw Score Trial 1	Raw Score Trial 2		Point Score
2 Walking Forward on a Line	6 steps	steps	Raw: 0 / 1–2 / 3–4 / 5 / 6 — Point: 0 / 1 / 2 / 3 / (4)	4
7 Standing on One Leg on a Balance Beam—Eyes Open (10 sec)	10+5 seconds	10 seconds	Raw: 0.0–0.9 / 1.0–2.9 / 3.0–5.9 / 6.0–9.9 / 10 — Point: 0 / 1 / 2 / 3 / (4)	4

Subtest 6: **Running Speed and Agility**	Raw Score Trial 1	Raw Score Trial 2		Point Score
One-Legged Stationary Hop (15 sec)	6 hops	11 hops	Raw: 0 / 1–2 / 3–5 / 6–9 / 10–14 / 15–19 / 20–24 / 25–29 / 30–39 / 40–49 / ≥50 — Point: 0 / 1 / 2 / 3 / 4 / (5) / 6 / 7 / 8 / 9 / 10	5

Subtest 7: **Upper-Limb Coordination**	Raw Score Trial 1	Raw Score Trial 2		Point Score
1 Dropping and Catching a Ball—Both Hands	5 catches		Raw: 0 / 1 / 2 / 3 / 4 / 5 — Point: 0 / 1 / 2 / 3 / 4 / (5)	5
6 Dribbling a Ball—Alternating Hands	10 dribbles	dribbles	Raw: 0 / 1 / 2 / 3 / 4–5 / 6–7 / 8–9 / 10 — Point: 0 / 1 / 2 / 3 / 4 / 5 / 6 / (7)	7

Subtest 8: **Strength**	Raw Score		Point Score
2a Knee Push-ups **OR** (circle one) **2b** Full Push-ups (30 sec)	8 push-ups	Raw: 0 / 1–2 / 3–5 / 6–10 / 11–15 / 16–20 / 21–25 / 26–30 / 31–35 / ≥36 — Point: 0 / 1 / 2 / (3) / 4 / 5 / 6 / 7 / 8 / 9	3
3 Sit-ups (30 sec)	10 sit-ups	Raw: 0 / 1–2 / 3–5 / 6–10 / 11–15 / 16–20 / 21–25 / 26–30 / 31–35 / ≥36 — Point: 0 / 1 / 2 / (3) / 4 / 5 / 6 / 7 / 8 / 9	3

Notes & Observations

68

Total Point Score Short Form (max = 88)

* For Subtest 2: Fine Motor Integration, add the facet scores, record the sum in the Raw Score column, and transfer the raw score for each item directly to the corresponding oval in the Point Score column.

Albert Brédell
22/07/08

SHORTForm

Subtest 1: **Fine Motor Precision**	Raw Score									Point Score
3 Drawing Lines through Paths—Crooked	0 errors	Raw	≥21	15–20	10–14	6–9	4–5	2–3	1	0	7
		Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
6 Folding Paper	12 points	Raw	0	1–2	3–4	5–6	7–8	9–10	11	12	7
		Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	

Subtest 2: **Fine Motor Integration**	Basic Shape	Closure	Edges	Orientation	Overlap	Overall Size	Raw Score*	Point Score
2 Copying a Square	0 1	0 1	0 1	0 1		0 1	5 points	5
7 Copying a Star	0 1	0 1	0 1	0 1		0 1	4 points	4

Subtest 3: **Manual Dexterity**	Raw Score Trial 1	Raw Score Trial 2											Point Score
Transferring Pennies (15 sec)	12 pennies	15 pennies	Raw	0–2	3–4	5–6	7–8	9–10	11–12	13–14	15–16	17–18	19–20	7
			Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	

Subtest 4: **Bilateral Coordination**	Raw Score Trial 1	Raw Score Trial 2											Point Score
3 Jumping in Place—Same Sides Synchronized	3 jumps	4 jumps	Raw	0	1	2–4	5							2
			Point	**0**	**1**	**2**	**3**							
6 Tapping Feet and Fingers—Same Sides Synchronized	10 taps	10 taps	Raw	0	1	2–4	5–9	10						4
			Point	**0**	**1**	**2**	**3**	**4**						

Subtest 5: **Balance**	Raw Score Trial 1	Raw Score Trial 2											Point Score
2 Walking Forward on a Line	6 steps	6 steps	Raw	0	1–2	3–4	5	6						4
			Point	**0**	**1**	**2**	**3**	**4**						
7 Standing on One Leg on a Balance Beam—Eyes Open (10 sec)	3 seconds	5 seconds	Raw	0.0–0.9	1.0–2.9	3.0–5.9	6.0–9.9	10						2
			Point	**0**	**1**	**2**	**3**	**4**						

Subtest 6: **Running Speed and Agility**	Raw Score Trial 1	Raw Score Trial 2												Point Score
One-Legged Stationary Hop (15 sec)	10 hops	10 hops	Raw	0	1–2	3–5	6–9	10–14	15–19	20–24	25–29	30–39	40–49	≥50	4
			Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	

Subtest 7: **Upper-Limb Coordination**	Raw Score Trial 1	Raw Score Trial 2										Point Score
1 Dropping and Catching a Ball—Both Hands	5 catches		Raw	0	1	2	3	4	5				5
			Point	**0**	**1**	**2**	**3**	**4**	**5**				
6 Dribbling a Ball—Alternating Hands	6 dribbles	8 dribbles	Raw	0	1	2	3	4–5	6–7	8–9	10		6
			Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**		

Subtest 8: **Strength**	Raw Score											Point Score
2a Knee Push-ups **OR** (circle one) 2b Full Push-ups (30 sec)	12 push-ups	Raw	0	1–2	3–5	6–10	11–15	16–20	21–25	26–30	31–35	≥36	4
		Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	
3 Sit-ups (30 sec)	13 sit-ups	Raw	0	1–2	3–5	6–10	11–15	16–20	21–25	26–30	31–35	≥36	4
		Point	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	

Notes & Observations

65

Total Point Score Short Form (max = 88)

* For Subtest 2: Fine Motor Integration, add the facet scores, record the sum in the Raw Score column, and transfer the raw score for each item directly to the corresponding oval in the Point Score column.

Albert
09-09-08

SHORTForm

Subtest 1: Fine Motor Precision	Raw Score									Point Score
3 Drawing Lines through Paths—Crooked	0 errors	Raw	≥21	15–20	10–14	6–9	4–5	2–3	1	0	7
		Point	0	1	2	3	4	5	6	7	
6 Folding Paper	12 points	Raw	0	1–2	3–4	5–6	7–8	9–10	11	12	7
		Point	0	1	2	3	4	5	6	7	

Subtest 2: Fine Motor Integration	Basic Shape	Closure	Edges	Orientation	Overlap	Overall Size	Raw Score*	Point Score
2 Copying a Square	0 (1)	0 (1)	0 (1)	0 (1)		0 (1)	5 points	5
7 Copying a Star	0 (1)	0 (1)	(0) 1	0 (1)		0 (1)	4 points	4

Subtest 3: Manual Dexterity	Raw Score Trial 1	Raw Score Trial 2											Point Score
2 Transferring Pennies (15 sec)	14 pennies	16 pennies	Raw	0–2	3–4	5–6	7–8	9–10	11–12	13–14	15–16	17–18	19–20	7
			Point	0	1	2	3	4	5	6	7	8	9	

Subtest 4: Bilateral Coordination	Raw Score Trial 1	Raw Score Trial 2						Point Score
3 Jumping in Place—Same Sides Synchronized	5 jumps	5 jumps	Raw	0	1	2–4	(5)	3
			Point	0	1	2	3	
6 Tapping Feet and Fingers—Same Sides Synchronized	10 taps	10 taps	Raw	0	1	2–4	5–9	(10)	4
			Point	0	1	2	3	4	

Subtest 5: Balance	Raw Score Trial 1	Raw Score Trial 2							Point Score
2 Walking Forward on a Line	6 steps	6 steps	Raw	0	1–2	3–4	5	(6)	6
			Point	0	1	2	3	4	
7 Standing on One Leg on a Balance Beam—Eyes Open (10 sec)	5 seconds	6 seconds	Raw	0.0–0.9	1.0–2.9	3.0–5.9	6.0–9.9	10	3
			Point	0	1	2	3	4	

Subtest 6: Running Speed and Agility	Raw Score Trial 1	Raw Score Trial 2												Point Score
3 One-Legged Stationary Hop (15 sec)	15 hops	26 hops	Raw	0	1–2	3–5	6–9	10–14	15–19	20–24	25–29	30–39	40–49	≥50	7
			Point	0	1	2	3	4	5	6	7	8	9	10	

Subtest 7: Upper-Limb Coordination	Raw Score Trial 1	Raw Score Trial 2									Point Score
1 Dropping and Catching a Ball—Both Hands	5 catches		Raw	0	1	2	3	4	(5)		5
			Point	0	1	2	3	4	5		
6 Dribbling a Ball—Alternating Hands	8 dribbles	10 dribbles	Raw	0	1	2	3	4–5	6–7	8–9	(10)	7
			Point	0	1	2	3	4	5	6	7	

Subtest 8: Strength	Raw Score											Point Score
2a Knee Push-ups OR (circle one) 2b Full Push-ups (30 sec)	5 push-ups	Raw	0	1–2	(3–5)	6–10	11–15	16–20	21–25	26–30	31–35	≥36	2
		Point	0	1	2	3	4	5	6	7	8	9	
3 Sit-ups (30 sec)	10 sit-ups	Raw	0	1–2	3–5	(6–10)	11–15	16–20	21–25	26–30	31–35	≥36	3
		Point	0	1	2	3	4	5	6	7	8	9	

Notes & Observations

70

Total Point Score Short Form (max = 88)

* For Subtest 2: Fine Motor Integration, add the facet scores, record the sum in the Raw Score column, and transfer the raw score for each item directly to the corresponding oval in the Point Score column.

Name :	Age:	Facility/ Location:	Date:
① Albert	13	Indoors / Staff room	29-07-2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
☑ Learn to control distractibility □ Learn to control visual tracking □ Learn to control time-on-task □ Learn to use short-term memory □ Learn to discriminate among cues, signals, objects, people in the environment	☑ Body Awareness ☑ Vestibular ☑ Proprioceptive □ Visual □ Auditory □ Tactile	□ Verbal cues/ motivation □ Visual and Auditory cues □ Demonstrations □ Mental pre-set □ Maintain concentrations □ Attentional switching □ Organization □ Frequent/ immediate feedback □ Individualized activities	□ Positive reinforcement □ Response cost □ Token economy □ Reduce external distractions □

Activities	Individualized activities and homework
➢ Static balance on ball- proper form on ball ➢ Dynamic Balance- moving hips and arms ➢ Assisted push-up on ball and floor ➢ Tabletop- Balance ➢ Walking out with Ball ➢ Bridging Rhythm and Dance- tapping bodyparts and hopping on ball	* Bridge * Swiss ball activities
Comment: * Very poor stability and pectural control * low muscle tone * very poor proprioception * struggles to keep extremeties stable * struggles to focus. Constant reminder of posture	

Name :	Age:	Facility/ Location:	Date:
Albert	13	Outdoors	05-05-2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
□ Learn to control distractibility ☑ Learn to control visual tracking □ Learn to control time-on-task □ Learn to use short-term memory □ Learn to discriminate among cues, signals, objects, people in the environment	□ Body Awareness □ Vestibular ☑ Proprioceptive ☑ Visual □ Auditory □ Tactile	☑ Verbal cues/ motivation ☑ Visual and Auditory cues ☑ Demonstrations □ Mental pre-set ☑ Maintain concentrations □ Attentional switching □ Organization ☑ Frequent/ immediate feedback □ Individualized activities	☑ Positive reinforcement □ Response cost □ Token economy □ Reduce external distractions □

Activities	Individualized activities and homework
➢ Following moving objects with eyes, without moving head- ball on a string and flash light. ➢ Learning to juggle with 2 beanbags and later tennis balls ➢ Manipulating ball @ own pace through beacons ➢ Dribble with foot and hand ➢ Throw and catch without partner and with partner ➢ Spatial inclusion- using auditive as well, partner stands behind person bouncing ball to left, right or over head. Person has to be ready to swivel and move to catch ball before second bounce. Ball and bucket- person is ready to catch ball with bucket- ball can be thrown through air or bounced. Person must catch ball before second bounce.	* Juggling < socks / tennisballs * one-handed throw-catch ↳ wall + partner
Comment: * very fond of outdoors → Reacts + encouragement (Nb) * Good at manipulation of bigger objects. * Difficult try with speed ↑ → ↓ performance. * Uncomfortable mover → give up when struggle → tires easily	

Name :	Age:	Facility/ Location:	Date:
③ Albert	13	Outdoors	12-08-2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
□ Learn to control distractibility □ Learn to control visual tracking □ Learn to control time-on-task ☑ Learn to use short-term memory □ Learn to discriminate among cues, signals, objects, people in the environment	☑ Body Awareness □ Vestibular □ Proprioceptive □ Visual □ Auditory □ Tactile	□ Verbal cues/ motivation □ Visual and Auditory cues □ Demonstrations □ Mental pre-set □ Maintain concentrations □ Attentional switching □ Organization □ Frequent/ immediate feedback □ Individualized activities	□ Positive reinforcement □ Response cost □ Token economy □ Reduce external distractions □

Activities	Individualized activities and homework
➢ Simon Says ➢ What did i spell ➢ Shifting beanbags- midline crossing ➢ Clapping game- body parts and memory sequencing e.g. 1 clap= touch nose, 2 claps= jump in air, 3 claps= touch left knee, 4 claps= turn 360 degrees ➢ Moving different directions and intensities ➢ Jumping on dots- directions ➢ Braingym activities on wall Tasks while standing on bozu ball	* Practice previous weeks again
Comment: * Good @ activities when focussed * improves with lots of repitition * visual cueing play role with learner. * Bozu ball = fails to keep centered.	didn't do homework

Name :	Age:	Facility/ Location:	Date:
Albert	13	Outdoors	19-08-2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
□ Learn to control distractibility □ Learn to control visual tracking ☑ Learn to control time-on-task □ Learn to use short-term memory □ Learn to discriminate among cues, signals, objects, people in the environment	□ Body Awareness □ Vestibular □ Proprioceptive □ Visual ☑ Auditory ☑ Tactile	☑ Verbal cues/ motivation ☑ Visual and Auditory cues □ Demonstrations ☑ Mental pre-set □ Maintain concentrations □ Attentional switching □ Organization □ Frequent/ immediate feedback □ Individualized activities * encouragement	□ Positive reinforcement □ Response cost □ Token economy □ Reduce external distractions □

Activities	Individualized activities and homework
➢ Obstacle- how will you go about overcoming obstacle-think and tell and then act...rethink and act. ➢ Swopping balls into same colors- rules to game. Thing, tell and do. ➢ Task at hand... how will you solve task... tactile and aditory- grouping and memorizing ➢ Memory game cards	Memory game activities
Comment: * Lost in detail * On track when focused * starts before instructions * constant reminders	

Name :	Age:	Facility/ Location:	Date:
(5) Albert	13	Outdoors (steep)	26-08-2008

Focus on Development of Attention	Sensory Motor Content Focus	Teaching Strategies used	Behavioral Strategies Used
□ Learn to control distractibility □ Learn to control visual tracking □ Learn to control time-on-task □ Learn to use short-term memory ☑ Learn to discriminate among cues, signals, objects, people in the environment	□ Body Awareness □ Vestibular □ Proprioceptive ☑ Visual □ Auditory □ Tactile	☑ Verbal cues/ motivation □ Visual and Auditory cues ☑ Demonstrations □ Mental pre-set ☑ Maintain concentrations ☑ Attentional switching ☑ Organization □ Frequent/ immediate feedback □ Individualized activities	□ Positive reinforcement □ Response cost □ Token economy □ Reduce external distractions □

Activities	Individualized activities and homework
➢ Throwing @ targets on wall ➢ Throwing into bucket and different obstacles on ground ➢ Throwing @ cones disregard other colors- only concentrating on colors called out ➢ Rolling balls @ different targets ➢ Kicking ball @ differnt targets ➢ Hoop vs Bucket ➢ Variety with different instructions	Start with little distractions and add as person can disregard more distractions
Comment: *Enjoyed all activities = love outdoors * good skill + performance. Force + strength control problem = overcorrects * encouragement ok *complains of constant back-pain (lower back) *gives up if not motivated, or successful * refocus on aim/outcome.	

Appendix F- Letters/Consent/ADHDT

STELLENBOSCH UNIVERSITY
CONSENT TO PARTICIPATE IN RESEARCH

Dear Parent/ Guardian

My name is Ingha Rathbone and I am currently completing my Masters degree in Sport Science at Stellenbosch University. My research is focused on the impact of participation in motor development programmes on children who show signs of Attention Deficit Hyperactivity Disorder. I will be starting a motor development programme in August, 2008, and would like to ask your permission to invite your child to participate in the programme.

Purpose of the Research

The overall aim of the project is to gain better understanding of how motor development programmes can be structured to provide benefits for children who show signs of Attention Deficit Disorder or Attention Deficit Hyperactivity Disorder.

Procedures

I will use a case study approach. Each child who participates in the programme will receive an individual physical activity programme, presented in 40 minute sessions once a week for a period of 6 weeks. I will be the instructor for all of these sessions and will ensure that the physical activities offered to your child are appropriate for his/her level of skill and physical fitness.

I will pre-test your child's level of motor development at the beginning of the program and end of the 6-week period in order to determine if participation has resulted in any improvements in motor skills.

I will also ask you and your child's teacher to assist me in assessing the signs of Attention Deficit Disorder or Attention Deficit Hyperactivity Disorder that you child may show. For six weeks prior to the programme, I will ask you to respond to a series of questions about your child's behaviour on a weekly basis. This will give us a profile that describes your child when he/she is not involved in a motor development programme. Then, during the programme, I will ask that you to continue to respond to the same questions on a weekly basis in order to determine if there are any changes in how your child behaves when he/she is involved in a motor development programme, or after he/she has completed the programme. Your child's teacher will also be asked to respond to these same questions on a weekly basis so that we can determine if behaviour at school is affected as well as behaviour at home.

POTENTIAL RISKS AND DISCOMFORTS

It is always possible that a child may experience an injury when participation in any physical activity programme. This risk is greatly reduced in this study since the children will not be playing with each other, but only with me. This means I can effectively control most of what is happening in the activity sessions. We also play with special equipment rather than official sport equipment. This equipment, such as sponge balls and bean bags, are much easier for children to handle safely.

In the unlikely case of an accident, I am qualified in first aid and teach with a first aid kit and my cell phone with me. I have the number of emergency services on my clipboard should a health incident occur.

POTENTIAL BENEFITS

Participation in the physical activity programme will be delivered in a spirit of playfulness and will emphasize enjoyment. In this positive environment, it is anticipated that your child will improve in some of his/her motor skills and may experience improvement is self-confidence as a result.

If the programme is successful in contributing to a more positive behavioural profile in terms of the signs of Attention Deficit Disorder or Attention Deficit Hyperactivity Disorder for your child, a contribution will be made to the educational body of knowledge about the value of participating in physical activity programmes.

PAYMENT FOR PARTICIPATION

There is no payment for participation in the study. My professional services will be provided at no cost to you. All pre-and-post testing as well as all sessions will be held at the school, during school hours or just after school. This will however have no negative impack on your child's schoolwork.

CONFIDENTIALITY

I would like to emphasise that because this is a case study, not only is your child treated as an individual and provided with a custom programme, but he/she will not be compared to any other children. You will receive a confidential report from me that will describe how your child progressed throughout the programme. In the formal report of my research, no mention will be made of your child's name or his/her school in order to protect his/her anonymity.

PARTICIPATION AND WITHDRAWAL

Both you and your child would have to agree to participate in this study. If you would be willing to have your child participate in this study, it would still be necessary for him/her to consider whether or not to volunteer. This means that either you or your child may choose to withdraw at any time.

FURTHER OUESTIONS AND ENQUIRIES

I will be available on Friday 28th of May 2008 from 8h00 to 14h00 at Vergezicht Private School if you have any questions or enquiries on the program.

Ingha Rahbone

Cel: 0827118056

Email: 13792636@sun.ac.za

SIGNATURE OF RESEARCH SUBJECT OR LEGAL REPRESENTATIVE

The information above was provided to me by Ingha Rathbone in English and Afrikaans at a group meeting of parents of potential participants in this study. I am in command of one or both of these languages. We were given the opportunity to ask questions and these questions were answered to my satisfaction.

I hereby consent to allow my child to be given the opportunity to participate in this study, if he/she would like to do so after hearing a presentation made individually to him/her about the programme from Ingha Rathbone.

_____

Name of Child

_____

Name of Parent or Legal Representative

_____ _____

Signature of Parent or Legal Representative **Date**

SIGNATURE OF CHILD

I would like to join the physical activity programme that Miss Rathbone described to me.

_____ _____

Signature of Child **Date**

SIGNATURE OF INVESTIGATOR

I declare that I explained the information given in this document to_____ (name of parent or legal representative) at a group session with the parents of all potential participants. He/she was encouraged and given ample time to ask me any questions. This presentation was conducted in English and in Afrikaans. If the parents/legal representative was positive about his/her child's participation, they were asked to sign the consent form above.

I then spoke individually with each of the children whose parent/legal representative had indicated that they wanted their child to have the opportunity to participate in the physical activity programme. During this conversation in either English or Afrikaans (depending on the child's preference), I encouraged him/her to ask me questions. I ask at the end of the conversation if the child wanted to volunteer to join the programme. If the answer was affirmative, I asked the child to sign the consent form above

_____ _____

Signature of Investigator **Date**

STELLENBOSCH UNIVERSITEIT

INSTEMMING OM AAN NAVORSING DEEL TE NEEM

GEAGTE OUER/ VOOG

My naam is Ingha Rathbone en ek is tans besig om my M graad in Sportwetenskap aan die Universiteit van Stellenbosch te voltooi. My navorsing fokus op die inpak wat deelname aan gefokusde motoriese ontwikkelings programme mag hê op kinders wat tekens toon van Aandag Tekort Versteuring of AT/HV (Aandag tekort/hiperaktiwiteitsversteuring). My motoriese ontwikkelings program sal in Augustus, 2008, sy aanvang neem en ek sal graag u toestemming wil vra om u kind uit te nooi om aan die program deel te neem.

DOEL VAN DIE STUDIE

Die hoof doel van die projek is om meer insig te bekom oor hoe motoriese ontwikkelings programme gestruktureer kan word om voordele vir kinders, wat tekens van aandagafleibaarheid (AT/HV) toon, in te hou.

PROSEDURES

Ek sal gebruik maak van die gevallestudie (case-study) metode gedurende die ondersoek. Elke kind wat aan die program deelneem sal ‘n geindividualiseerde fisieke-aktiwiteits program ontvang. Die program sal een maal per week vir 30- 40 minute duur oor ‘n ses week periode. Ek sal die instruktriese wees vir al die sessies oor die ses weke periode en sal verseker dat die aktiviteite wat aan u kind aangebied word toepaslik sal wees tot sy/haar vlak van vaardigheid en fisieke fiksheid.

Ek sal u kind se vlak van motoriese ontwikkeling aan die begin van die program en weer aan die einde van die ses weke program toets, om so vas te stel of deelname aan die program tot enige verbetering in motoriese vaardighede gelei het.

Ek sal van u en die kind se onderwyser ook verlang om my te assisteer in die assessering vir die tekens van AT/HV wat u kind mag toon. Vir 6 tydperk voor die aanvang van die program sal ek van u verlang om ’n paar vrae te beantwoord oor u kind se gedrag op ’n weeklikse basis. Dit sal vir ons ’n profiel verskaf wat aan ons toon wie u kind is as hy/sy nie aan ’n motoriese ontwikkelings program deelneem nie. Ek sal dan graag ook van u verlang dat u hierdie vraelys op ’n weeklikse basis voltooi gedurende die verloop van die program. Dit is om vas te stel of die kind enigsins anders optree gedurende deelname aan die program, of nadat hul aan die program deelgeneem het. Daar sal ook van u kind se onderwyser verlang

word om hierdie vraelys gedurende deelname aan die program te voltooi om vas te stel of daar veranderinge in beide die skool- en huisomgewing, met deelname aan die program, plaasgevind het.

MOONTLIKE GEVARE EN ONGEMAK

Daar bestaan altyd die moontlikheid dat u kind ’n besering mag opdoen gedurende deelname aan enige fisieke aktiwiteits program. Die gevaar hiervan word grootliks verminder gedurende die betrokke studie omdat die kinders nie met mekaar sal speel gedurende die program, maar slegs met my. Dit beteken dat ek ten alle tye effektiewe beheer kan uitoefen oor meeste van die goed wat binne die aktiwiteits sessie kan gebeur. Daar word ook van spesiale toerusting gedurende die sessie gebruik gemaak en nie net die normale sportstoerusting. Hierdie toerusting sluit in: sponsballe en boontjiesakkies, wat baie makliker vir kinders is om veilig te hanteer.

Indien daar wel iets sou gebeur kan u berus by die feit dat ek ‘n gekwalifiseerde noodhulp houer is en met ‘n noodhulpkissie onderrig ten alle tye. My selfoon is ook ten alle tye by my en die nodige noodnommers is op my “klipblad” indien enige gesondheidstoestand sou voorval.

MOONTLIKE VOORDELE

Deelname aan die fisieke aktiwiteits program sal in “a spirit of playfulness” aangebied word, met die hoofdoel dat die kinders die sessies sal geniet. In lig van die positiewe omgewing waarin die sessies sal plaasvind, is daar die verwagting dat u kind in sommige van die motoriese vaardighede sal verbeter en dit ook sal bydra tot beter selfvertroue in die kind.

Indien die program suksesvol is in die bydra tot ’n meer positiewe optrede profiel in terme van die AT/HV Toets vir u kind, sal dit ’n groot bydra kan lewer tot die opvoedkundigeliggaam van kennis ten opsigte van die waarde wat deelname aan fisieke aktiwiteits programme het.

KOSTES VERBONDE AAN DEELNAME

Daar is geen kostes verbonde aan deelname aan die studie nie. My Professionele dienste sal gratis aan u verskaf word gedurende die verloop van die program. Alle pre-en-post toetsings asook alle sessies sal by die skool gedurende skooltyd of net na skool plaasvind. Dit sal egter geen negatiewe impak op u kind se skoolwerk hê nie.

KONFIDENSIALITEIT

Ek wil dit graag beklemtoon dat omdat die program ’n gevallestudiebenadering volg, word u kind nie alleen as individueel behandel nie, maar word hy/sy ook van ’n geïndividualiseerde program versien wat slegs vir hul ontwerp is en glad nie met die ander gevallestudies vergelyk word nie. U sal ’n konfidensiële verslag van my ontvang waarin die progressie van u kind deur verloop van die program beskryf sal word. In die formele uiteensetting van my navorsing sal daar glad nie gebruik

gemaak word van u kind se naam of die naam van sy/haar skool om absolute anonimiteit te waarborg.

DEELNAME EN ONTTREKKING

Beide u as ouer en u kind sal moet instem om aan die program deel te neem. Indien u sou belangstel om u kind in te skryf vir die program sal u kind egter eers ook toestemming moet verskaf om aan program deel te neem. Dit beteken ook dat dit u kind of u vry staan om enige tyd van die program te onttrek hetsy enige rede.

VERDERE NAVRAE

Ek sal op Vrydag 28 Mei 2008 vanaf 8h00 tot 14h00 beskikbaar wees by Vergezicht Privaat Skool om u meer van die program te vertel of enige vrae wat u mag hê te beantwoord.

Ingha Rathbone

Sel: 0827118056

Email: 13792636@sun.ac.za

HANDTEKENING VAN OUER/ VOOG

Die bostaande inligting was deur me Ingha Rathbone aan my verskaf in beide Afrikaans en Engels by ŉ bespreking vir potensiële deelnemers aan die studie. Ek is minstens een van die tale magtig waarin die inligting aan my oorgedra is. Daar was geleentheid vir vrae in verband met die studie wat na my satisfaksie beantwoord is.

Hiermee gee ek dus toestemming dat my kind aan die studie mag deelneem, indien hy/sy graag wil na alle inligting in ŉ individuele sessie aan hul oorgedra en verduidelik is deur me Ingha Rathbone.

_____

Naam van Kind

_____

Naam van Ouer / Voog

_____ _____

Handtekening van ouer/voog **Datum**

HANDTEKENING VAN KIND

Ek sal graag aan die fisieke aktiwiteits program wil deelneem soos deur Mej Rathbone aan my verduidelik is.

_____ _____

Handtekening van Kind **Datum**

HANDTEKENING VAN NAVORSER

Ek verklaar dat ek die inligting in hierdie dokument verduidelik het aan _____ (naam van ouer/voog) by geleentheid waar potensiële ouers ook vrae kon vra in verband met die studie. Hy/sy is aangemoedig en genoegsame tyd gegee om enige vrae te vra. Die voordrag is in Afrikaans en Engels aan die ouers/voog gedoen. Indien die ouer/voog positief oor hy/sy kind se deelname aan die program was is die ouer gevra om die bostaande toestemmings brief te teken

Ek het individuele sessie met die kinders gehad na die ouer/voog se instemming in die fisieke aktiwiteits program. Gedurende die gesprek het ek in beide Afrikaans en Engels aan die leerders verduidelik wat die program behels en of hul enige vrae aangaande deelname het. Aan die einde van die sessie het ek die kind gevra of hul wel vrywilliglik aan die program wil deelneem. Indien die leerder aangedui het dat hul wel aan die program wil deelneem het ek hul gevra om die bostaande toestemmingsbrief te teken.

_____ _____

Handtekening van Navorser **Datum**

Duration of Program by Ingha Rathbone

28 May Question and Enquiry session at Vergezicht School…
I will be available at school from 8h-14h00

6 Weeks of Pre-Testing of ADHDT-one questionnaire per week
1. 9 - 15 June 2008
2. 16 - 22 June 2008
3. 23 - 29 June 2008
4. 30 June - 6 July 2008
5. 7 - 13 July 2008
6. 14 - 20 July 2008

Pre-Testing of Physical Component = 21 - 27 July 2008

6 Week Motor Program duration:
1. 28July - 3August 2008
2. 4 - 10 August 2008
3. 11 - 17 August 2008
4. 18 - 24 August 2008
5. 25 - 31 august 2008
6. 1 - 7 September 2008

Post-Testing of Physical Component = 8-14 September 2008

Program ends 14 September 2008

The ADHDT (Attention Deficit Hyperactivity Test) will be completed by the parent and teacher on a weekly basis throughout the duration of the Program.

ADHDT

Name of child:
Relation to child: Parent/ Teacher
Week:
Please indicate which of the following behaviors/ characteristics are a problem for the individual. Mark or circle the appropriate number. Do not skip any items.

		Not a Problem	Mild Problem	Severe Problem
1	Loud	0	1	2
2	Constantly "on-the-go"	0	1	2
3	Excessive running, jumping, climbing	0	1	2
4	Twisting and Wiggling in seat	0	1	2
5	Easily excited	0	1	2
6	Grabs objects	0	1	2
7	Excessive talking	0	1	2
8	Difficulty remaining seated	0	1	2
9	Constantly Manipulating objects	0	1	2
10	Inability to play quietly	0	1	2
11	Fidgets	0	1	2
12	Restless	0	1	2
13	Squirms	0	1	2
14	Acts before thinking	0	1	2
15	Fails to wait for one's turn	0	1	2
16	Fails to wait for one's turn	0	1	2
17	Difficulty waiting turn	0	1	2
18	Blurts out answers	0	1	2
19	Impulsive	0	1	2
20	Interrupts conversations	0	1	2
21	Intrudes on others	0	1	2
22	Does not wait for directions	0	1	2
23	Fails to follow rules of games	0	1	2
24	Poor concentration	0	1	2
25	Fails to finish projects	0	1	2
26	Disorganized	0	1	2
27	Poor planning ability	0	1	2
28	Absentminded	0	1	2
29	Inattentive	0	1	2
30	Difficulty following directions	0	1	2
31	Short attention span	0	1	2
32	Easily distracted	0	1	2
33	Difficulty sustaining attention	0	1	2
34	Difficulty staying on task	0	1	2
35	Difficulty completing tasks	0	1	2
36	Frequently loses things	0	1	2